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RADIOCARBON DATING IN THE ARCTIC*

HENRY B. COLLINS

RADIOCARBON DATES for the Arctic thus far determined by Arnold and Libby represent four time levels. The latest dates are for the Eskimo period. These are derived from wood samples from five sites in northern and northwestern Alaska ranging in age from 912 ± 170 (Ipiutak) to 2258 ± 230 years (Okvik). Johnson's site in Yukon Territory, Canada, dated at 1519 ± 150 years, would also fall within this period if the assigned date is correct; however, the site is probably considerably older than this. Next in age is an early site in the Aleutian Islands with a date, from charcoal samples, of 3018 ± 230 years. The age of the Trail Creek cave on Seward Peninsula is given as 5993 ± 280 years. This is a pre-Eskimo site related to the Denbigh Flint complex; the latter has not as yet been dated. Two dates have been obtained from the Pleistocene muck deposits near Fairbanks, one sample at $12{,}622 \pm 750$, and another at over 20,000 years (Arnold and Libby, 1951).

The radiocarbon dating of this handful of Arctic archaeological sites, covering a time span of some 6000 years, can be considered as only a beginning of what remains to be done. Many more sites in Canada and Greenland as well as Alaska must be tested if the new dating technique is to serve as an effective check on the time estimates and relative chronologies previously suggested. The few radiocarbon dates thus far announced for the coastal parts of Alaska are, I believe, consistent in general with the archaeological evidence. I cannot agree with the statement by Johnson, Rainey, Collier and Flint (1951) in their summary of radiocarbon dating that "The dates for horizons in Alaska do for the most part differ from present archaeological conceptions." This would be true enough if by "present archaeological conceptions" were meant the Larsen-Rainey conception of Ipiutak as the basic Eskimo culture. However, radiocarbon dating was not needed to show the loopholes and inconsistencies in this theory. As the Ipiutak theory seems to have been accepted more or less at face value it may be well to consider briefly what has been claimed for it and what the archaeological evidence and radiocarbon dates show.

The date for the Old Bering Sea culture suggested by Jenness and myself and perhaps generally accepted prior to the uncertainty introduced by the discovery of Ipiutak, was something around 2000 years or a little more. The radiocarbon date for Okvik, the earliest phase of Old Bering Sea, is now shown to be 2258 ± 230 years. When Ipiutak was first discovered it was described as an independent, pre-Eskimo culture unconnected, except in art style, with Old Bering Sea (Rainey, 1941a, 1941b). However, it was clearly evident, even on the basis of the preliminary reports, that the two cultures were closely related, not only because of the identity of many of their art motifs and patterns but also because of the large number of implement types, some of them elaborate and specialized, that were shared in common. For this reason, and because of close parallels in stone work between Ipiutak and the early Siberian Neolithic, the writer suggested that Ipiutak was in part contemporaneous with and in part older than Old Bering Sea; and that though it was the oldest Eskimo culture known, its maximum age was probably not much more than 2000 years (Collins, 1943), an estimate that had to be reduced somewhat when the complete Ipiutak report appeared.

In the final report by Larsen and Rainey (1948) Ipiutak is presented not as pre-Eskimo or non-Eskimo but as basic Eskimo — as the type culture of a palae-Eskimo complex, the original foundation on which all other Eskimo cultures rest. The prehistoric Cook Inlet, Aleu-

* Paper presented at Symposium on Radiocarbon Dating, 17th Annual Meeting Society for American Archaeology, Columbus, Ohio, May 3, 1952.

tian, and Dorset cultures, though later, were closely related to Ipiutak, as were also the modern Caribou, Nunatagmiut, and Bering Sea Eskimos. Together with the Near Ipiutak, they all belonged to the Ipiutak or palae-Eskimo complex. Old Bering Sea, Birnirk, Punuk, Thule, and the modern Eskimos of north Alaska and Greenland, though descended from Ipiutak, are thought to represent a later and fundamentally different type of culture, called the Arctic Whale Hunting or neo-Eskimo culture. This new conception of Ipiutak is as open to question as the original one which viewed it as earlier than and unrelated to any other Eskimo culture, or indeed more so, as the margin of error keeps pace with the growing complexity of the theoretical structure. As this is not the place for a full critique of the Ipiutak theory, I will mention only two points that have special relevance to the question of dating. First is the fact that though Ipiutak is presented as the type culture of a palae-Eskimo complex ancestral to all other Eskimo cultures, ancient and modern, the immediate ancestors of the Ipiutak Eskimos are supposed to have been an Iron Age people who lived along the lower Ob and Yenisei rivers in northern Siberia, 3000 miles west of Bering Strait, as late as the beginning of the Christian era. Viewed separately, each of these assumptions is inherently implausible; in combination they are incompatible and impossible.

The second point concerns the relationship of Ipiutak and Old Bering Sea. When the full report on the Ipiutak site appeared, it was apparent that the Ipiutak art complex included not only many typical examples of Old Bering Sea style 1 (Okvik) and style 2, but also a few examples of style 3, the latest and most highly developed form of Old Bering Sea art (Collins, 1951). Does this mean that Ipiutak and Old Bering Sea were contemporaneous and in contact with each other? If so, or if Ipiutak were the older culture, there should also be some indication of Ipiutak having influenced Old Bering Sea. However, no such evidence has yet appeared; on the contrary, diagnostic Ipiutak features are conspicuously absent at the dozen or more Old Bering Sea sites now known in Siberia and Alaska. Two of the Old Bering Sea objects found at Ipiutak are of particular interest in showing the time relationship between the two cultures. These are fragments of two ivory "winged objects," similar in shape to Indian banner stones. These "winged objects" are one of the most striking and diagnostic features of the Old Bering Sea culture, and on St. Lawrence Island it has been possible to trace their development through a long series of related forms beginning in the Okvik, through the later phases of Old Bering Sea and into the Punuk (Collins, 1937, pp. 197-201; 1951, pp. 430, 432). At Ipiutak only these two fragments were found, both representing the later, more developed Old Bering Sea forms. These two objects and the many other examples of Old Bering Sea art and implement types at Ipiutak are sufficient to indicate the prior existence of the Old Bering Sea culture. We may conclude, therefore, that old Bering Sea was earlier than Ipiutak and not an outgrowth of it, as postulated by Larsen and Rainey.

If the radiocarbon dates are accepted as correct there could be no doubt of this, for the age of Okvik, the earliest phase of Old Bering Sea, is given as 2258±230 years, as compared with 912±170 and 973±170 years for the two Ipiutak sites at Point Hope and Kotzebue Sound respectively. While the archaeological evidence indicates that Ipiutak is some centuries later than Old Bering Sea, I find it difficult to believe that it is 1300 years later. This would seem to be one of the instances where the radiocarbon dating should be questioned. The Ipiutak site is not frozen. The houses and burials were covered by only a few feet of loose gravel, which thaws in the summer and supports a dense growth of grass. As many of the bone and ivory objects have been eroded by grass roots there might have been opportunity for contamination *in situ*. I would expect a true date for Point Hope Ipiutak to be some 500 years or more earlier than A.D. 1000, the radiocarbon date, or somewhere in the early centuries A.D., only a little later than estimated by Larsen and Rainey. This would be in fair agreement with the 66 B.C. to 490 A.D. time span for the somewhat older Near Ipiutak culture represented in the middle level of Giddings' Cape Denbigh site (Giddings, 1952).

In the Aleutians we have a date of 3018± 230 years for a site on Umnak Island excavated by Laughlin (1952), belonging to the early period which Hrdlicka called pre-Aleut and Laughlin paleo-Aleut. The fact that the earliest stage of Old Bering Sea, early Aleutian, Cook Inlet, and Dorset shared in common certain specialized types of stone implements and

art motifs suggested an early connection between these now widely separated cultures (Collins, 1940; Quimby, 1945; de Laguna, 1947). This view was strengthened when additional resemblances were found between Ipiutak, Dorset and Aleutian (Larsen and Rainey, 1948). However, the many and fundamental differences between Old Bering Sea and Ipiutak on the one hand and Dorset and Aleutian on the other meant that the latter could not have been derived from any form of culture known from the Bering Strait area, and that consequently the ancestors of the early Aleuts and the Dorset people must have left Bering Strait more than 2000 years ago, before the full development of Old Bering Sea and Ipiutak (Jenness, 1941; Collins, 1940). The dates for two of the cultures — 3018±230 for early Aleutian and 2258±230 for early Old Bering Sea — are consistent with this interpretation. We have no dates for Dorset, but certain significant resemblances between this early eastern Eskimo culture and the Denbigh Flint complex are also in line with this same interpretation (Collins, 1950b, 1951).

This brings us to the most important problem of Arctic archaeology — the interpretation and particularly the date, of the Denbigh Flint complex. This remarkable culture, discovered by Giddings in 1948 at Cape Denbigh on the Bering Sea coast, is a microlithic assemblage consisting mainly of three categories of implements: (1) delicately rechipped lamellar flakes, tiny blades made from such flakes, and the polyhedral cores from which they were struck off; (2) blades of generalized Folsom and Yuma types; and (3) a large assortment of burins like those known previously only from upper Paleolithic and Mesolithic horizons in the Old World. Overlying this basal Denbigh Flint complex, and separated from it by a sterile layer of laminated sandy clay, was a stratum containing flint and other implements closely resembling Ipiutak, south Alaskan and Dorset types, dated at 1460±200 and 2016±250 years. Above this middle layer were remains left by Eskimos who had occupied the site for another 500 years, from about 1100 to 1600 A.D. (Giddings, 1951, 1952).

Whatever the age of the Denbigh Flint complex it has important implications for American archaeology. It links Folsom and Yuma with the lamellar flake-polyhedral core industry found at several places in interior Alaska and at Mesolithic sites in Mongolia and elsewhere in central and eastern Asia. And it provides the first clear evidence — mainly burins — of early Old World stone techniques associated with early American cultures.

Dates for the Denbigh complex are lacking but organic material from near the bottom of one of the Trail Creek caves on Seward Peninsula excavated by Helge Larsen has been dated at 5993±280 years. The accompanying stone implements include lamellar flakes but not burins or some of the other Denbigh types. As at Denbigh, the upper levels of the cave contained early and later Eskimo material. If, as seems likely, the Trail Creek cave is later than Denbigh, we have a minimum age of 6000 years for the latter. I would hazard a guess that the maximum age of the Denbigh complex will not be greatly in excess of this, or in any event little more than 8000 years. This might seem an overly cautious estimate in view of its Folsom and Yuma associations and the further fact that Denbigh is the only site in the New World containing an impressive array of stone implements directly comparable to those of the upper Paleolithic of Europe. However, as to the Yuma and Folsom-like blades at the Denbigh site, we cannot ignore the possibility, or to my mind the probability, that these are vestiges from an earlier period. This would certainly be the preferred explanation if, as seems likely, the other Folsom and Yuma points found in interior Alaska, either at surface sites or in the frozen silt deposits reportedly in association with extinct animals, should indicate a Folsom-Yuma complex in Alaska of comparable antiquity to that in the western United States.

A careful study of the basal parts of the Denbigh site, made by David M. Hopkins, has produced evidence of climatic change (Giddings, 1952). I am not aware, however, that the evidence here for climatic and ecologic change is of comparable magnitude to that observed at early man sites to the south. It must be remembered that the Denbigh site is on the present shore line facing Norton Bay, one of the shallowest parts of the shallow Bering Sea. During the last glaciation (during which Alaska, except for high mountainous areas, was ice free) Norton Bay was dry land, like all of northern Bering Sea, and would presumably have remained a land surface for a considerable time after deglaciation set in. If we assume that the first settlers came to Cape Denbigh during or not long after the Mankato sub-stage they would have been an inland

people, living on top of a bluff overlooking a broad low valley. They would have hunted only land animals, as the sea would have been many miles to the west of them. We would then have to suppose that much later, after the low valley had become a shallow sea, a maritime people, the Eskimos, came, and through mere coincidence established their village on exactly the same spot, and hunted seals, walrus and beluga where land animals formerly had roamed. I find it much easier to believe instead that the first people came to Cape Denbigh at a later time when the relation of sea to land was essentially the same as today, and that they hunted both sea and land mammals just as did the Eskimos who came after them. The fact that the early Denbigh people used short, wide, thin blades practically identical with those found hafted to sealing harpoon heads at Ipiutak, lends support to this interpretation.

It might of course be possible, geologically, that the Denbigh site antedated the last glaciation; that it was occupied during the Cary-Mankato interval when sea level was more or less as it is today. This, however, would force us to conclusions extremely difficult to accept. It would mean that Denbigh was much older than and ancestral to Folsom. It would mean a tremendous time interval — the whole of the Mankato glaciation and thousands of years thereafter — between the time the site was first occupied by the Denbigh people and the time — 66 B.C. — when it was reoccupied by the early Eskimos. The 2 to 18 inch thick stratum of sandy clay separating the Denbigh Flint complex from the lowest Eskimo stratum is hardly suggestive of a time interval of this length. Finally, it would be impossible, archaeologically, to assign so great an age to the extremely highly developed Denbigh flint technique, which, though associated with upper Paleolithic implement types, is itself essentially Neolithic in character.

The Paleolithic-Mesolithic burins, which are such an important part of the Denbigh complex, might also seem to be *prima facie* evidence for a considerable antiquity. Giddings (1951) has pointed out that the main burin types of the Aurignacian are present at Cape Denbigh, a truly remarkable situation considering that not a single burin had been reported previously from anywhere in America. However, with the impetus of the Denbigh discovery, we have come to learn more about the burin in the American Arctic. In 1950 I suggested that the Denbigh burins were the prototypes of a class of Eskimo implements, mostly Dorset, that Frederica de Laguna had recognized as having been used as burins. But it was not until I personally examined Hackman's collection of Denbigh type implements from Anaktuvuk Pass in the Brooks Range in northern Alaska (Solecki and Hackman, 1951) that I realized that the type of burin there represented — one of the Denbigh types — rather than resembling the Dorset "burin-like" implements as a group, was specifically similar to only one type in that group. This was a specialized form that had been found in large numbers in the so-called "Stone Age" of Disko Bay, west Greenland (Solberg, 1907), and that had been described variously as drill points or boot sole creasers. In other respects the Greenland "Stone Age" closely resembled the prehistoric Dorset culture of the eastern Arctic (Collins, 1937, 1940). At the Philadelphia meeting of the American Association for the Advancement of Science, in December, 1951, I pointed out that this particular type of Greenland implement was a true burin, descended from the Anaktuvuk and Denbigh burins; that they belonged to the Dorset complex, being similar to a type found at a Dorset site on Baffin Island; and that the burin tradition had been continued by the modern Eskimos, whose iron-pointed composite knife or "antler chisel," which functioned exactly as a burin, was an adaptation of the "burin-like" stone implements of the Old Bering Sea and Dorset (Collins, 1953). Since then additional examples of true burins have been reported from other Dorset sites in Greenland and Canada (Meldgaard, 1952; Knuth, 1952). The burin, therefore, did not pass out of use in the Mesolithic but continued to be used by Dorset Eskimos long after the time of the Denbigh Flint complex. A similar situation is found in Siberia where Okladnikov (1950) reports burins in association with pottery.* We see, then, that burins do not have the same time connotation in Siberia and the American

* For this reference I am indebted to Lauriston Ward, who informs me further that at one of the sites yielding burins and pottery Okladnikov also describes the basal end of a fluted point, resembling Folsom Fluted, the first to be recorded for Eurasia. The site is on the Kullaty River, a tributary of the Lena, about 35 kilometers south of Yakutsk, and the blade is illustrated on Plate XI of Okladnikov's publication.

Arctic that they do in western Europe. While the presence of these implements would be sufficient to date a west European site as not later than Mesolithic no such rule can apply to eastern Eurasia where they persisted into the Neolithic, or in Arctic America where they were used by the Dorset Eskimos probably within the past two thousand years.

What may we say as to a possible relationship between the Denbigh Flint complex and later Eskimo cultures? When I first postulated a relationship between the Mesolithic and early Neolithic cultures of Eurasia and the earliest Eskimo cultures in Alaska it seemed necessary for a number of reasons to emphasize that the resemblances did not extend beyond the Eskimo sphere, in time or in space (Collins, 1943). From the evidence then available, the problem of early man in America was something apart, a problem to be considered on a wholly different time level. The discoveries at Cape Denbigh have strengthened the hypothesis of the Mesolithic origin of Eskimo culture, but in an unexpected manner. They have revealed an Alaskan culture of Mesolithic character at least 6000 years old, that is related to but apparently later than Folsom and Yuma. It is also related to Mesolithic sites in northern Asia which are probably ancestral to the early Neolithic sites around Lake Baikal which in turn show such close affinities with early Eskimo. The question now is, does the Denbigh complex itself exhibit features that can be identified with Eskimo, or are its affinities entirely with pre-Eskimo manifestations in America and Eurasia? Rainey, mainly on the basis of the time interval involved, has expressed the latter view:

> At the present moment we do not know whether early settlers of the Arctic regions are in any way related to the Eskimo people. If the results of radioactive carbon analysis give us dates for the Cape Denbigh Flint Complex which fall within the last two or three millennia, then we may make a fair assumption that they were ancestral to and related to Eskimo, but if the deposits prove to be many thousands of years old, which now appears more likely, any assumption of direct historical relation becomes very dubious (Rainey, 1951).

The great difference in age between Denbigh and the earliest Eskimo cultures, though an important factor, cannot in itself be a decisive indication of lack of connection if there is cultural evidence to the contrary. Though Denbigh is undoubtedly thousands of years older than anything we can now describe as Eskimo, there are, to my mind, strong indications that a connection of some kind exists. Briefly, these are: (1) the Denbigh and Anaktuvuk burins can be shown to have been the prototypes of similar burins used by the Dorset Eskimos in Canada and Greenland; (2) lamellar flakes, so prominent a feature of the Denbigh flint technique, were also characteristic of the Dorset, and polyhedral cores like those at Denbigh are also found at Dorset sites; (3) the presence of small, finely chipped side blades indicates that the Denbigh people used slotted bone points, probably arrowheads, with inset blades along the sides, a form characteristic of Ipiutak and the European Mesolithic; (4) the Denbigh people, as stated before, used short, wide, thin blades identical with those found on sealing harpoon heads at Ipiutak; (5) a very unusual form of arrowpoint, slender and with slanting base, was another type shared in common by Denbigh and Ipiutak (cf. Giddings, 1951, Fig. 61*a*, 9, *10*, with Larsen and Rainey, 1948, Pl. 2, fig. 7).

These resemblances between the Denbigh Flint complex and early Eskimo culture seem too close and too numerous to have been fortuitous. They have meaning in terms of cultural origins and cultural continuity regardless of the great disparity in age between Denbigh and early Eskimo. With each major discovery in the field of Arctic archaeology one important point has become increasingly clear. This is that the pattern and development of Eskimo culture are the result of a combination of geographical, ecological, and cultural factors that are truly unique. Culturally as well as geographically the Arctic has always been a marginal area, a refuge area or reservoir where cultural traits and life patterns inherited from earlier times have persisted long after they have been discontinued elsewhere. Thus, in the isolation of the Arctic the Eskimos have continued what is basically a Mesolithic way of life up to the beginning of the present century, or at some places up to the present time. This applies not only to the general configuration of their culture — a hunting and fishing economy that utilized with equal facility the resources of land and sea — but also to specific Mesolithic culture traits, including almost identical forms of bird and fish spears, and lances and arrows with rows of narrow flint blades set in the sides. And now still another

important and specialized Mesolithic implement — the stone burin — is added to the repertory of prehistoric Eskimo culture. The Denbigh Flint complex affords another and earlier example of this phenomenon of cultural stability and lag in the Arctic. The Denbigh people, with a stone industry in large part of Neolithic stamp, perpetuated a Paleolithic tradition in the use of burins just as much later, in Iron Age times, the Ipiutak Eskimos continued to use side-bladed arrows and lances of Mesolithic-Neolithic type long after they had passed out of use in Eurasia.

Viewed in this light it is not at all surprising that despite their definite Paleolithic-Mesolithic affinities, the early Cape Denbigh people were also in some way related to the Eskimos who later occupied the same region. A relationship also existed between the Denbigh Flint complex and Folsom and Yuma. If these interpretations are correct it means that the hitherto distinct problems of Eskimo origins and of early man in America must now be considered in a single frame of reference. Radiocarbon dating in the Arctic thus has an opportunity to contribute to the elucidation of an archaeological problem and situation that seems to be unique in North America — namely, to set up the necessary time markers for a cultural continuum that may link a living people of today, the Eskimos, with early man of thousands of years ago.

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A COMPARATIVE STUDY OF THE PRECERAMIC OCCUPATIONS OF NORTH AMERICA*

WESLEY R. HURT, JR.

IN VIEW OF THE present turmoil in North American archaeology caused by the continuing release of radiocarbon dates, it is most difficult to maintain an understanding of the preceramic occupations. What seems like a good guess today is tomorrow relegated to the realm of unwarranted speculation. The continual excavation of preceramic sites in North America and the constant revision in geological and climatological theories also force us to be cautious in making interpretations and to be willing to change any of them. Yet the evidence now available for reconstructing the preceramic traditions in some instances appears to be sufficient and reliable enough to justify certain interpretations, even though reservations must be kept in mind. In particular the relative chronology of several cultural complexes is slowly taking form.

It is most tempting to revise our North American cultural chronology on the basis of radiocarbon dates alone. If this is done, many of our currently accepted interpretations based only on archaeological evidence must be changed. One such problem is handled by Griffin in his discussion of the Adena and Hopewell radiocarbon dates, which indicate Adena in certain areas is younger than Hopewell, the reverse of the generally accepted picture (Griffin, 1951). However, the possibilities of contamination, incorrect correlations with geologic formations and climatic phases, and the probable error involved in the present radiocarbon analysis demand caution in accepting the dates at face value (Johnson, Rainey, Collier, and Flint, 1951; Bliss, 1952). Nevertheless, several dates agree closely with the estimates obtained previously by other techniques, and we can be reasonably sure of their accuracy within the range of probable error. For example, Harrington estimated a date of about 8500 years for the earliest occupation of Gypsum Cave (Johnson, 1951, p. 8; Harrington, 1933, p. 171). It can be concluded, then, that only by correlating the radiocarbon dates with geological, biological, and archaeological evidence can we accept or reject a specific date.

To understand the development of the preceramic cultural traditions and complexes it is necessary not only to order them into a sequential framework, but also to correlate them with the environmental changes of the past. "Tradition" is here arbitrarily defined as a basic economic pattern, while "complex" refers to a linked series of other cultural traits, in particular artifacts that may extend over a wide area and time. Categories based on time intervals alone do not serve our purpose, while the moisture cycles, biological changes, and the geological features of the past were not constant throughout North America. If we accept the theories of Flint, Bryan, and Antevs, among others, that the past temperature fluctuations in North America and possibly throughout the northern hemisphere were synchronous, we have a constant to build a framework (Flint, 1947, Table 8; Bryan, 1950, Tables 6, 7; Antevs, 1948). Without doubt, variations in temperature result in climatic, geologic, and biotic changes which in turn affect cultural changes. While the temperature cycles of the past must be inferred from other events, they are utilized in ordering the data in this report because of their wide geographical applicability.

Unfortunately the archaeologist is not presented with any accepted and well-ordered sequence of climatic phases by the climatologist or geologist. In many instances the dating of the climatic phases and geological formations are dependent upon archaeological evidence. Thus the environmental picture of the preceramic cultural sites is still highly controversial.

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TEMPERATURE CYCLES OF THE WISCONSIN GLACIAL AGE

Since we have no positive evidence of man in North America before the Wisconsin glacial age no attempt will be made to define the temperature cycles of earlier ages. In this paper, Flint's suggestion that the Wisconsin glacial age continued to the present is followed, rather than any of the classifications which refer to a "Recent" or "Post-glacial" phase after the last major Wisconsin glaciation (Flint, 1947, pp. 451,452). Antevs' subphases of the Neothermal (the post-glacial) are not utilized for North America as a whole because they refer to both temperature cycles and local moisture changes in the Great Basin (Antevs, 1948, p. 176). Instead the temperature cycles of the Wisconsin glacial age from the beginning until present will be referred to by symbols such as W1, W1/W2, and W2.

W1. A cold cycle correlated with the Iowan glaciation. Estimated by Antevs to have occurred between 70,000 to 60,000 years ago (Antevs, 1948, p. 171).

W1/W2. Warm cycle correlated with the Peorian interstadial. Estimated by Antevs to have occurred between 55,000 and 35,000 years ago (Antevs, 1948, p. 171).

W2. A cold cycle with two subphases corresponding to the Tazewell-Cary glaciations, separated by an interstadial (Bryan, 1950, p. 101). The radiocarbon dates indicate a time period of over 20,000 years ago (Flint, 1951, pp. 54-55).

W2/W3. A warm cycle, possibly a little cooler than present. Corresponding possibly with the buried Two Creeks Forest in Wisconsin and assumed to be earlier than the Mankato glaciation (Bryan, 1950, p. 101, Table 4; Flint, 1951, p. 54; Deevey, 1951, p. 56). The Two Creeks radiocarbon dates seem to be associated with the Valders stage of glacial advance, and average 11442±350. They appear to be contemporary with those from Moorhead Station No. 2, Wisconsin, at 11283±700 years (Johnson, 1951, pp. 9-10). This is substantiated by Rosendahl's and Mason's observation that the Moorhead flora is of an interstadial type (Schultz, Lueninghoener, and Frankforter, 1951, pp. 35-36). Krieger has noted, however, that these dated specimens may belong to the post-Mankato interstadial (Krieger, personal communication, January, 1952). The Moorhead and the Two Creeks dates appear a little old if the assumption made below that the last glacial advance, the Cochrane, did not begin until after 10000 B.P. (Before Present) is correct (Moss et al, 1951, Fig. 27).

W3. A cold cycle theoretically correlated with the Mankato glaciation in North America. Can be divided into several subphases, the Valders advance and the formation of the upper Mankato lobe during the climax (Bryan, 1950, p. 101). Antevs calls attention to a succeeding warm cycle, the Le Pas-Petawawa halt recorded in moraines in Canada (Antevs, 1950, p. 46). Moss notes that the upper and lower Farson terraces near the Finley site, Wyoming, apparently correlate with the Mankato climax and a later phase of retreat (Moss et al, 1951, Fig. 27). The lowermost deposits from the Leonard rockshelter, Nevada, and Danger cave, Utah, dated by radiocarbon at about 11000 B.P., rest directly on top of gravels deposited by water of nearby lakes (Heizer, 1951 p. 94, fn. 1; Johnson, 1951, p. 18). Apparently these gravels represent not the highest water levels but a stage of recession.

If we accept Bryan's theory that the pluvial cycles of the Southwest-Great Basin were coeval with the glacial phases, this date of 11000 B.P. may indicate that the Mankato climax was passed by that time (Bryan, 1950, pp. 90-96). By utilizing varve analysis and correlations with North European data, Antevs estimated that the Mankato climax occurred some 20,000 years ago (Antevs, 1950, p. 46). Until further dates are obtained from proven Mankato formations we must be cautious in accepting the Two Creeks dates of about 11500 B.P. for a phase of the Valders stage of ice advance.

W3/W4. A warm cycle that may correspond with the Mankato-Cochrane interstadial. Schultz and his co-workers note in terrace 2A at Lime and Medicine Creeks, Nebraska, evidence of a cold, periglacial type of climate in the strata above the lowermost soil level YY with radiocarbon dates of 10493 ±1500; 9524±450. They correlate these upper deposits, however, with the Mankato glaciation rather than the Cochrane, considering the former did not end until some eight to seven thousand years ago (Schultz, Lueninghoener, and Frankforter, 1951, pp. 8, 35; Holder and Wike, 1949).

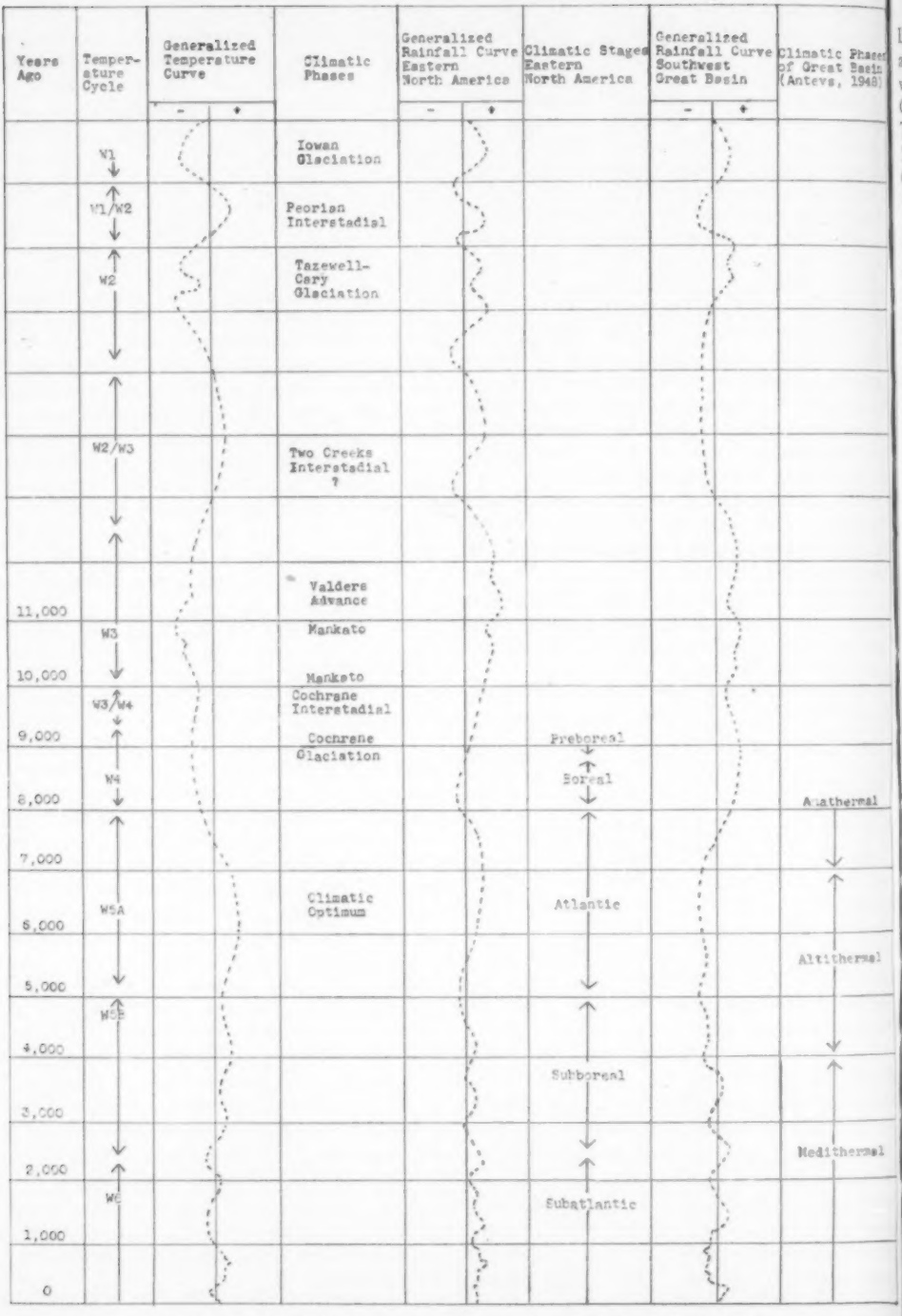

FIG. 80. Generalized North American climatic phases of Wisconsin glaciation.

The evidence from the deposits of Gypsum, Leonard, and Danger caves does not indicate any major pluvial cycle after 11000 B.P., as we would expect if the Mankato rather than the Cochrane climax occurred after this time. Thus, there is the possibility that the 9,500 to 10,000 years ago dates from Lime and Medicine Creeks, Nebraska, apply to the W3/W4 cycle (Mankato-Cochrane interstadial).

W4. A cold cycle probably corresponding with the last known continental glaciation, the Cochrane. Compared with the Mankato glaciation this was apparently much smaller in magnitude. As mentioned previously the radiocarbon dates from Lime Creek, Nebraska may indicate that this cycle did not begin until after 9500 B.P. The ice this time did not extend as far south as did the Mankato glaciation, for its terminal moraine lies near Cochrane, Ontario, about at the midpoint between James Bay and Lake Huron. The date of the final melting of this continental ice is unknown, although it may have occurred in a short interval. The European geologists on the basis of varve analysis date the final melting of the continental ice in Sweden at about 8800 B.P. (Zeuner, 1946, pp. 26-32). This does not prove, however, that the present temperature level was attained at that time. Brooks states that by about 8000 B.P. the climate was already 5° F. warmer than now (Brooks, 1949, p. 297). This date may be a little too early judging by radiocarbon dated formations in the Southwest. If the assumption is correct that a rise in temperature above present levels in the Southwest would increase the aridity of the region because of a rise in evaporation rate, the radiocarbon dates from Whitewater Draw in Arizona may indicate that cooler temperatures than present prevailed somewhat later than 8000 B.P. The Sulphur Spring stratum at Whitewater Draw indicates running water decreasing to pond deposits in the interval between 7756±360 and 6210±450 B.P. (Sayles and Antevs, 1941, pp. 46-55; Johnson, 1951, pp. 8, 15). It should be noted that today this is a dry arroyo.

If a date of about 8000 to 7000 B.P. is accepted as the termination of the W4 cycle, the first half of the Anathermal of the Southwest-Great Basin, defined by Antevs as a time of greater moisture than now present, may belong to the last half of the W4 cycle (Antevs, 1948, pp. 176-178). This date also may mark the end of the Boreal climatic subphase in the area of Connecticut, judging by the 8323±400 radiocarbon date from Pollen zone B, Upper Linsley Pond (Johnson, 1951, p. 5). This climatic subphase is considered to be a warm, dry time in the area, characterized by pine trees (Flint, 1947, Table 29). However, it is difficult to ascertain whether the weather was slightly cooler or warmer than present.

W5. A cycle characterized by several fluctuations which, on the whole, had an average temperature higher than present. The fluctuations in temperature and accompanying climatic and geologic conditions furnish a basis for several subdivisions within the cycle. Brooks has noted that the onset of the temperature rise in the area of Sweden above present levels appeared to have begun suddenly, about 9000 years ago. He also believes that the climax of the temperature maximum for Europe occurred between 8000 and 5000 B.P., and the rainfall maximum between 7000 and 6000 B.P. (Brooks, 1949, pp. 142, 296, Figs. 32, 38). As noted previously, the 9000 B. P. date for the onset of higher temperatures than present may be about 1000 years too early.

The climatic subphase associated with the temperature climax in northern Europe is generally referred to as the Atlantic. Theoretically this subphase was a warm, moist climate. Pollen zone C1 from Connecticut apparently corresponds with the temperature maximum cited above by Brooks. The radiocarbon dates of this zone from Upper Linsley Pond agree closely with Brooks' estimates, for they show a time range from about 8000 years ago to 5159±350 (Johnson, 1951, p. 5). The flora is of a type suggesting a climate similar to the Atlantic of northern Europe (Deevey, 1951, pp. 56-57). Brooks' estimate that the peak of the temperature climax was passed by 5000 B.P. is also supported by the radiocarbon dates of 4508±600 B.P. from the deposits of Wet Leggett, New Mexico, indicating a climate in transition from a warm to a cooler type (Johnson, 1951, p. 16; Martin, Rinaldo, and Antevs, 1949, pp. 55-56). Brooks has noted that during the time from 5500 to 4500 years ago there was less rainfall in Europe than at present. Whether this condition prevailed in northeastern North America is unknown.

The climatic subphase of the Southwest-Great Basin which is apparently associated with the temperature climax (the Climatic

Optimum) is the first half of the Altithermal defined by Antevs. He dates the whole subphase between 7,000 and 4,000 years ago (Antevs, 1948, pp. 176-179). In contrast to the moist climate in eastern North America, drought conditions prevailed, marked by erosional surfaces in the geologic deposits. For convenience in this report the time when the temperatures were apparently at their climax, about 7,500 to 5,000 years ago is called the W5A cycle.

Pollen dated by radiocarbon from the C2 zone, Upper Linsley, Connecticut, indicates that after about 5000 B.P. the boreal vegetation, pine, returned to the region, indicative of drier and probably cooler temperatures. This pollen zone has been assumed to correlate with the Subboreal climatic subphase of northern Europe (Deevey, 1951, p. 57). As Brooks and others have noted there do not seem to have been any abrupt climatic changes between the Atlantic and Subboreal climatic subphases. Rather there was a gradual transition characterized by falling temperatures and decreasing moisture (Brooks, 1949, pp. 296-298). The transition between the temperature climax and the succeeding cooler stage apparently is marked by the beginning of deposition of waterborne material as indicated at Wet Leggett. Charcoal dated 4006±270 from beds associated with the Chiricahua Cochise, indicative of a climate somewhat warmer than present, supports the theory that the present temperature level was not attained until 4000 years ago (Johnson, 1951, p. 16). Brooks and others believe that no radical change in the climate occurred until about 2500 years ago, when there is unmistakable evidence in Europe that there was a sudden falling of temperatures and increase in rainfall (Brooks, 1949, p. 299, Figs. 31, 38). This change is considered to be radical enough to warrant the classification of a new climatic subphase, the Subatlantic. For convenience the W5 cycle is considered to have ended at 2500 years ago, and the time period between 5000 years ago and 2500 years ago is assigned to the W5B cycle.

Undoubtedly there were several fluctuations in the climate during the W5B cycle. Brooks' theoretical temperature curve indicates at about 5000 B.P. the temperature was only slightly warmer than present, and by 4500 years ago had attained another minor heat climax, which slowly fell again to a low level by 3900 B.P. Since that time it rose to the minor heat climax slightly before the sudden fall by 2500 B.P. (Brooks, 1949, Fig. 33). He cites as evidence Godwin's work from pond deposits in England which indicate dry conditions approximately contemporary with the lower temperature levels (Brooks, 1949, p. 298). This time period in the Southwest was apparently marked also by several climatic fluctuations and geologic changes. Lakes and watercourses which had dried up during the height of the temperature maximum slowly appeared again. They may have made their first appearance during the theoretically low temperature levels about 5000 or 3800 years ago, although the sudden drop in temperature about 2500 years ago was probably responsible for the birth of many of them. Antevs accepts a date of about 4000 for the onset of cool and moist conditions in the Southwest (the Medithermal) (Antevs, 1948, p. 179). This is based on earlier estimates by Russell and others that the salinity in certain lakes in Nevada and California indicate that the lakes were reborn some 4000 years ago (Russell, 1885, p. 224; Flint, 1947, pp. 494-497). Hanson has suggested, on the basis of a study of Bear River delta, Alaska, that the mountain glaciers were not reborn until 3600 years ago, which agrees closely with Brooks' temperature curve indicating a lower level about 3800 to 3600 years. Brooks' corrected rainfall curve of Huntington's analysis of sequoia tree rings indicated a rise in rainfall between 3800 and 3500 B.C. (Brooks, 1949, Fig. 37; Hanson, 1934, p. 495).

The minor heat climax indicated on Brooks' curve between the years of 3000 and 2500 years ago was apparently associated with a drought cycle in the Southwest referred to as the San Pedro erosion by Antevs (Sayles and Antevs, 1941, p. 19; Antevs, 1948, p. 179). This is marked by an erosional disconformity separating the beds containing artifacts of the Chiricahua and San Pedro complexes at Whitewater Draw, Arizona. As previously noted, the radiocarbon dates for the Chiricahua Cochise were about 4500 and 4000 B.P., while a date of 2463±310 has been obtained from the San Pedro site No. 3 (Johnson, 1951, p. 15).

To summarize the information given above, the W5 cycle was apparently a time of fluctuating temperatures which on the whole averaged higher than present. In the W5A cycle, which may date as early as 9000 years

ago, although there is evidence that about 8000 years ago is more probable, the temperature rose as high as 5° F. above present levels. In northeastern North America and northern Europe this included the Atlantic climatic subphase characterized by heavier rainfall than present. The climatic category referred to as the Climatic Optimum probably falls into the W5A. In the Southwest-Great Basin the last half of the Anathermal and the first half of the Altithermal were probably contemporaneous — climatic subphases marked by drought. The W5A cycle is arbitrarily considered to have ended at 5000 years ago. This marked the end of the temperature climax and the beginning of falling and fluctuating temperatures. The W5B cycle is complex, and contains several subphases marked by rising and falling temperatures. The cycle itself is considered to have ended with the rapid fall in temperatures about 2500 B.P. The Subboreal climatic phase in eastern North America is considered to belong to the W5B cycle, while in the Southwest and Great Basin the first third of the Medithermal is placed here. In the East there appears to have been an alternating series of wetter and drier periods, which on the whole may have averaged warmer and drier than present, while in the Southwest-Great Basin much the same conditions prevailed, although the Southwest-Great Basin droughts probably corresponded with wet cycles in the East and vice versa.

W6. A cycle characterized by temperatures that averaged cooler than those of the W5. This cycle is considered to have begun with the sudden fall of temperature about 2500 years ago. Although the ensuing time up until the present probably should be considered as part of this cycle, the subphases after the theoretical minor temperature climax somewhat after 1000 years ago will not be discussed. The remainder of the climatic fluctuations fall well within the North American ceramic complexes. Brooks' corrected rainfall curve of Huntington for the area of California based on the tree rings of the sequoia indicates that it was wet between 500-250 B.C.; dry between 250-100 B.C.; wet between 100 B.C. to 200 A.D.; dry between 300-800 A.D. and wet between 900-1100 A.D. (Brooks, 1949, Fig. 37, pp. 342-355). Antevs notes the occurrence of a drought in the Southwest about 1 A.D., exemplified by a disconformity above the San Pedro strata at Whitewater Draw (Antevs, 1948, p. 179). This may correlate with the drought mentioned above between 250-100 B. C. The theoretical wet period in the Southwest-Great Basin beginning about 500 B.C. may correspond to the so-called "Little Pluvial," when lower terraces in now extinct lakes such as Lake San Augustin theoretically were formed. Some of the strata which compose terrace I of Lime and Medicine Creeks, Nebraska, may have been deposited during this same wet period, judging by the radiocarbon dates from a buried hearth from Cedar Canyon of 1993±190 to 2379±430 (Johnson, 1951, p. 13).

In eastern North America and northern Europe the Subatlantic climatic subphase is generally considered to be associated with the time period after 2500 years ago. As a whole period this subphase is considered to have been more moist and cooler than the preceding W5B cycle, the Subboreal. Without doubt, several fluctuations occurred during this period. For example, Brooks notes the possibility that the climate between 500 B.C. and 1 A.D. was more moist and cooler than present. About the time of Christ the climate was similar to that of present. After that a drier subphase lasted until about 180 A.D., to be followed by a wetter subphase between 180 and 350 A.D. He notes also that similar fluctuations continued until the present (Brooks, 1949, Table 21).

THE PRECERAMIC CULTURAL COMPLEXES

As yet the time and type of culture of the first immigrants to the New World is unknown. At best we can speculate on the proto-types of the earliest known cultural traditions. Going beyond to earlier hypothetical prototypes starts a pyramiding of assumptions. Whether pre-Wisconsin man existed in North America is still a moot question. There is little disagreement that the main route was across the Bering Straits from Asia during the Wisconsin glacial age. The probable presence of a land bridge across the straits during the climaxes of the major Wisconsin glaciations indicates that the cold cycle rather than the interstadial phases was a more favorable time for early intercontinental migration. During the cold cycles the presence of continental ice in the Wisconsin glacial age made the interstadials a more favorable time for man's migration southward

from Alaska. Since the central area of Alaska was not covered by the last major glaciations, as pointed out by Smith, there is little question that man could have lived there during a glacial climax (Smith, P. 1937, p. 91). Once man migrated southward from Alaska he probably moved fanwise throughout North America. The scarcity of paleo-Indian sites in eastern North America to the contrary, there is no apparent reason why man would have restricted himself to the area west of the Mississippi during an interstadial. As Rosendahl noted, the flora from the Moorhead Station No. 2, Wisconsin (apparently correlated with the Two Creeks interstadial) indicates that for a time previous to the Mankato glaciation a climate not greatly different from that of today prevailed, while the same observation can be made of the Mankato-Cochrane interstadial, judging by the deposits from soil YY Medicine Creek, Nebraska (Schultz, Lueninghoener, and Frankforter, 1951, pp. 29, 36). The migration routes southward would have followed mountain passes, plains areas, river valleys, and low ridges.

We can be sure that man entered the New World earlier than the occupation of sites in the Southwest. Clovis fluted points, and other artifacts such as beveled bone points, are found at the Clovis site below the blue silts—the latter attributed to one of the last great pluvial cycles of the Southwest, possibly coeval with the Mankato glaciation or the Cochrane (Cotter, 1938). The latter subphase is indicated by the radiocarbon date of 9883±350 from comparable formations containing Folsom points with the blue silts near Lubbock, Texas (Johnson, 1951, p. 16). Antevs believes that the blue silts were formed after the Mankato glaciation (Antevs, 1949, pp. 188-190). Hibben and Bryan have noted the strong possibility that the Sandia complex, found below two levels indicative of major pluvial fluctuations in the Southwest is from a pre-Mankato interstadial phase (Hibben, 1941, pp. 53, 65). Thus, the Sandia complex was separated from the Folsom stratum by a layer of yellow ocher, indicative of a wet cycle. The Folsom occupation in turn lies under a layer of precipitated limestone in a now dry cave. Because of their lack of definite geologic context the sites of early man found to date in Alaska are not of great aid in establishing the time of man's initial migration to the New World. All we can conclude at the moment is that there is the possibility of man's having entered North America during a glacial climax earlier than the Mankato and migrating southward as early as the Two Creeks interstadial.

Equally as problematic is the type of culture of the first North American immigrants. That their economic basis included hunting, supplemented by fishing and collecting of vegetable products is most probable. Some of these hunters were equipped with lanceolate stone projectile points, percussion-flaked scrapers, blades, and choppers. Others may have had sharpened wood spears or spears with bone points. Absence of stone or bone projectile points in a preceramic site does not in itself prove the lack of hunting. The apparent absence of stone projectile points in the Sulphur Spring Cochise sites, with their large numbers of cracked and burned animal bones negates this assumption (Sayles and Antevs, 1941, p. 12). Krieger postulates that some early North American complexes reveal bone industries as old as any of the known stone complexes. He cites as evidence, for example, crudely pointed and beveled bone tools from the lowermost levels of the Clovis site and the exclusive bone industry from the Potter Creek cave, California (Krieger, 1951, p. 78). While a culture technology based predominantly on bone or wood may have existed, it is most difficult to conceive of a primitive people not making some use of stone tools in areas where the raw material is available.

Various species of the mammoth, mastodon, and bison undoubtedly confronted the early immigrants into the New World, and those who first moved south of the Canadian border. Gross has presented a challenging review of the North American sites which theoretically demonstrate the association of the paleo-Indian and the elephants and other proboscideans (Gross, 1951). His reasons for questioning the sites found in eastern North America of man and the various species of mastodon appear well taken. Gross and others have noted that the projectile points found with the mastodon in eastern North America belong to established late preceramic complexes. He also believes that the lack of mastodon bones in the beds of Canada correlated with the retreat of the last continental ice indicate that the mastodon did not survive in North America long into the "post-glacial"

period (Gross, 1951, pp. 112-113). He finds little reason to doubt, however, that the mammoth, *Elephas (Parelephas) columbi* (?) found at such sites as Dent, Colorado, the Cowan ranch in Texas, and at Clovis, New Mexico, prove that man killed the elephants (Gross, 1951, p. 123). Gross suggests also that the few bones of the *Mastodon americanus* found with the Sandia complex may have been fossil bones picked up by the Sandia Cave inhabitants (Gross, 1951, p. 123). Whether his observation is correct or not, the Sandia complex appears old enough to have co-existed with the mastodon. In Alaska there have been a considerable number of projectile points found with various species of mastodon and mammoth, unfortunately all in rather questionable circumstances (Hibben, 1943, pp. 254-259; Rainey, 1940, Fig. 16, pp. 299-308). For convenience, we can refer to these early hunters as belonging to an Elephant and Mastodon Hunters tradition, as long as the assumption is not made that only these animals were hunted. Sellards refers to the cultural complex from the lowest level at the Clovis site containing the Clovis fluted points and bone artifacts as the "Llano culture." This complex does not appear to be broad enough, however, to cover the manifold group of sites with proboscidian remains such as the Sandia complex.

Once the Elephant and Mastodon Hunters arrived in the New World they continued to perfect their projectile points, scrapers, choppers, and knives. As they moved into new areas, undoubtedly, they added various edible plants and animals to their diet. With further modification of their stone lanceolate points many of the types characteristic of the paleo-Indian complexes are possible, such as the Sandia, Clovis Fluted, Plainview, Scottsbluff, Eden, and several fluted types in eastern North America. With the exception of the Sandia and possibly the classic Clovis fluted and the classic Eden points, these types have been found in Alaska.

It is postulated that in the area of southern United States previous to the Cochrane glaciation and possibly as early as the Two Creeks interstadial the hypothetical stone projectile point complex slowly evolved into the Clovis and Sandia complexes. The Clovis point is lanceolate shaped with a concave base and a channeling from one to three-quarters the length. The channeling may have been accidentally discovered by the use of the technique of basal thinning. The Sandia point is basically lanceolate shaped, with a single side-shoulder modification. The Clovis points have been found as far east as the state of Georgia (Kelly, 1938, Fig. 5), and are apparently the basic model of some of the eastern fluted points. Wormington suggests that the makers of fluted points in the East were more recent in time than those in the West. She believes that the eastern fluted points originated when the higher temperatures and drier conditions in the West (at the Climatic Optimum) caused the natives to move to a more humid region (Wormington, 1949, p. 35). It should be noted that at the Parrish site, Kentucky, the fluted points seem to underlie the Indian Knoll complex (Webb, Wm. S., 1951). The radiocarbon dates for the Indian Knoll complex are 5149± 300 and 5302±300 (Johnson, 1951, Samples 251, 254, 116), approximately coeval with the end of the W5A cycle (Climatic Optimum—Atlantic).

At the moment the age of the fluted points in eastern North America remains a mystery, although there is no positive evidence that they belong to a time period any more recent than those of the West. In the East, in addition to the types which are similar if not identical to the classic Clovis fluted, there are several other varieties. The fluted points found at the Williamson site, Virginia, and the Shoop site, Pennsylvania, differ from the classic Clovis fluted in their technique of manufacture, according to Witthoft (McCary, 1951; Witthoft, 1952). He states that these points instead of having a single flake removed from the center of each face, had two channel flakes withdrawn on each side of the medial line, leaving a basal projection. Then a central flake was withdrawn. Witthoft suggests that this should be the prototype for the basal nipple on the classic Folsom points (Witthoft, personal communication). Thus, in technique of manufacture the Shoop points may represent a step between the Clovis and the Folsom points. Witthoft is inclined to believe that the Shoop points are as old as the Clovis, although this cannot be established one way or the other, since the Shoop points are without geologic evidence as to age. The technique of constricting the shoulders of some of the eastern fluted points, resulting in an outflared eared base, sets apart these forms from the classic Clovis

fluted, while the fact that they are less delicately made helps distinguish them from the Folsom. It should be noted that the fluted point from the Denbigh Flint complex and those illustrated by Solecki from northern Alaska resemble more closely some of the eastern fluted points than the classic Clovis or Folsom (Giddings, 1951, Fig. 63A; Solecki, 1951, Fig. 36). If the classic Clovis fluted point is the basic model for these other varieties, then those of eastern North America and Alaska belong to a later time period. However, until a thorough analysis of the manufacturing techniques of fluted points has been made, the information given above must be regarded as unproven hypothesis, rather than definite conclusion.

If the Sandia and Clovis complexes are pre-Mankato glaciation in age, the spread of the Mankato ice sheet may have isolated the cultures of Alaska from those of the United States. This could have prevented the fluted points from diffusing northward until the succeeding interstadial. Nothing, however, would have prevented the Clovis points from diffusing throughout southern United States at this time. What caused the Sandia complex to be concentrated along the edges of the southern Plains is unexplained. During the advance of the Mankato ice, conditions for human habitation of the southern Plains, Southwest, and Great Basin may have reached their climax. As a result, populations in this well-watered and prairie land were probably greater than during the Climatic Optimum several thousand years later. Large herds of bison were able to spread westward into areas that are now semi-arid steppes.

If the Folsom complex at Sandia cave is pre-Mankato climax, it is possible that as early as the Mankato advance in the southern Plains a further refinement of the Clovis points led to the classic Folsom fluted, which had a full-length channel and was smaller in size. However, the single radiocarbon date (9883±350) from the Folsom complex at Lubbock suggests that this event occurred after the Mankato climax (Johnson, 1951, p. 16). It is to be noted that the Folsom hunters did not expand their area much beyond the large herds of bison (Roberts, 1935, 1936). For convenience the Folsom complex can be assigned to a Large Bison Hunters tradition.

The area east of the Mississippi was probably too densely forested and wet during the Mankato ice advance to be as attractive for human occupation as it now is. These factors, coupled with the lack of large herds of bison probably caused the population to be small and widely scattered. The area of the northern Plains and northeast North America for a few hundred miles south of the advancing Mankato ice may have been unfit for habitation due to a cold arctic and subarctic climate. At the Mankato climax some populations would have moved south. In the area of California there is no evidence of large herds of bison in the past. As a result the people probably hunted around the lakes and mountains for smaller types of game. The percussion-flaked chopper and scraper complex, the Malpais, described by Rogers, may be representative (Rogers, 1939, pp. 6-22).

During the retreat of the Mankato ice, the prairie areas of the southern Plains gave way to grasslands while the steppes returned to the area further west. Further to the north in the Plains, the grasslands followed the waning ice sheet. In the area of eastern United States the conifers made their retreat northward. As Gross has noted, the mammoth and mastodon disappeared in North America soon after the Mankato climax (Gross, 1951, pp. 125-126). The over-all effect of the ice retreat on populations would have been a northward expansion.

The retreat of the Mankato ice probably caused ice-free corridors to open between the area of Alaska and the remainder of North America. Several distinct cultural complexes may have diffused out of Alaska at this time, and in particular during the Mankato-Cochrane interstadial. In addition, some of the cultural traits invented to the south could have diffused into Alaska. Possibly the fluted points entered Alaska for the first time, although we have no real proof that they did not originate there or in Asia. If any cultural complexes actually moved south at this time, it is difficult to single them out. Since the Plainview, Scottsbluff, and various types of obliquely-flaked lanceolate points have been found in Alaska, it is possible that they diffused into the area of the Plains at this time. The radiocarbon dates from the soil YY of the terrace 2A sites of Lime and Medicine Creeks, Nebraska (10493±1500 to 9167±600) suggest a contemporaneity between the Frontier and Scotts-

bluff complexes and the Folsom as represented at the Lubbock site (Johnson, 1951, p. 14). It should be noted that only one projectile point from the lowermost level at site 25, Ft 41, Lime Creek, falls into the Scottsbluff type (Mott Davis, personal communication).

About 10000±1000 years ago the climate once more became colder, and the ice moved southward to form the glaciation known as the Cochrane. This ice advance had several important effects on the flora and fauna. The grasslands and the large herds of bison spread westward into the areas, now steppeland, and a cold climate prevailed in the northern Plains and northeast North America. Thus, there may have been some population shifts south and westward. Migration between Alaska and the remainder of North America became somewhat more difficult. This ice advance may have resulted in the confinement in Alaska and nearby areas of the microlithic cultural complexes, such as those found at Cape Denbigh (Giddings, 1951) and on the campus of the University of Alaska (Rainey, 1940, Fig. 15).

The return of a colder climate in the northern Plains may have caused the Frontier and Scottsbluff complexes in the Medicine and Lime Creeks, Nebraska area to shift westward over into the mountain valley areas of the Rockies or Black Hills, as exemplified by the occupation of the Finley site, Wyoming. It is to be noted that the occupation levels at Lime and Medicine Creeks, which contain the Frontier, Plainview, and Scottsbluff points belong to an interstadial phase, while Moss and others have observed that the Scottsbluff-Eden complex at the Finley site seems to be correlated with the Cochrane glaciation (Schultz, Lueninghoener, and Frankforter, 1951, pp. 28-29; Moss, et al., 1951, Fig. 27). There may also have been a southward migration of the Plainview, Scottsbluff-Eden complexes at this time into the area formerly held by the Folsom hunters. As yet there is no proof that there was any physical contact between these later bison hunters and the Folsom people. For example, at the McHaffie site near Helena, Montana, the Scottsbluff and parallel points similar to Long points of the Angostura Basin definitely occur in a level above Folsom points (Forbis and Sperry, 1952).

After a period of a thousand or so years, the Cochrane ice began its northward retreat, possibly as early as 8000 years ago. Profound geological and climatic changes accompanied this ice retreat. Many watercourses and lakes began to dry up in the Southwest and Great Basin. Oak forests in the east started moving northward, while the area of the grasslands began shifting eastward. The hunters following this shifting zone of the bison herds may have helped spread the Scottsbluff and Plainview types of points eastward. The Great Lakes area became more favorable for human settlement. At least two complexes were characteristic of this area. One was an eastern variant of the Large Bison Hunters tradition of the northern Plains, with projectile points similar to the Scottsbluff and Plainview types. The artifacts from the Brown's Valley, Minnesota, site may be related to some of the Plains bison hunting complexes (Jenks, 1937). Apparently there was another series of complexes in the East during the Cochrane glaciation, characterized by percussion-flaked semi-lunar knives, ovoid blades, choppers, scrapers, and possibly bone and sharpened wooden projectiles. A manifestation of this complex was found at site B1-I, Georgian Bay, Canada, on the 320-foot terrace (Greenman and Stanley, 1943; Greenman, 1948). The writer observed a stone projectile point from the lower 297-foot terrace that resembles the Scottsbluff type. In none of these sites have there been found the polished stone tools characteristic of the "Archaic" sites in eastern North America.

In the better watered areas of the Southwest and Great Basin, the hunting traditions still existed during the Cochrane retreat. Gypsum cave apparently was first occupied as early as about 8500 years ago. Whether this complex was intrusive into the Southwest has not been determined. The main economic base was the hunting of ground sloths, horses, camels, and other animals, with the exception of bison (Harrington, 1933). The lack or scarcity of bison in the Great Basin during the Cochrane retreat accounts for this concentration on the other animals. Atlatls with wooden foreshafts were the main hunting element. The constricted-stemmed projectile points, the diagnostic trait of this complex, are common in the southern Great Basin, but in addition are found in the Southwest, Plains, and through the Southeast. At the Lindenmeier site a

Estimated dates years ago		Sandia Cave New Mexico	Clovis Site New Mexico	Lindenmeier Site, Colorado	Finley Site Wyoming	Medicine Lime Creek Nebraska	Leonard Cave Nevada	Gypsum Cave Nevada	Cochise Sites Arizona	Ventana Cave Arizona
	W1			Pre-Hose						
	W1/W2									
	W2			Hose Moraine						
12,000?	W2/W3	Sandia ? Complex?	Bed 2, Clovis Complex? Erosion Cycle							
11,000?	W3	Yellow Ochre Layer	Bed 3-Blue Silts	Corral Creek Moraine	Gravels-Upper Farson Terrace Lower Sands	584	Labonton Gravels	Gravels 221 Sloth dung		
10,000	W3/W4	Folsom Complex	Folsom Complex 558	Folsom Complex	Lower Sand Soil Middle Sand	Soil YY-TZA 570 571	Scottsbluff Points Silt and Carbonaceous Layers	Bat Guano Granite Point Complex		Ventana Complex
9,000	W4	Limestone Layer	Bed 3A Eden-Scottsbluffe Points	Long Draw Moraine	Scottsbluff-Eden Points	Soil and Loess		212 Gypsum Cave		
8,000				Gypsum Cave Points		T2-F11A Soil B	298		216 Beds B1	
7,000					Soil-Middle Sand Sand	Soil ZZ		Complex	Sulphur Spring B2 Cochise	
6,000	W5A		Erosional			Downcutting	278 Leonard Complex		511	
5,000			Disconformity		Upper Sand	Terrace ZA				
4,000	W5B					Soil Y	277		515	Ventana-Amargosa I
3,000						Terrace T1			Chiricauhua Complex	Ventana-Amargosa II
2,000	W6		Bed 4-Sands	Protolus rampart		Silt and Loess 469	275 Lovelock Complex		519 San Pedro Complex	San Pedro Complex
1,000						Downcutting T1		Basketmaker		Hohokam

FIG. 81. North American archaeological sites correlated with climatic phases.

Gypsum point came from a stratum above the Folsom occupation (Roberts, 1940, p. 70). It should be noted that a point similar to the Gypsum cave type was found with the bones of *Mastodon americanus* and possibly the ground sloth by Koch in Gasconade County, Missouri. That this point is related in time to the Gypsum cave point is questionable since there were also several other points found in the same site of the stemmed and corner-notched types. The latter, apparently, belong to the later eastern Archaic complexes (Gross, 1951, p. 103, pl. 18 *E*). Points similar to the Gypsum cave type were found in the Guilford complex, North Carolina by Coe under the Badin focus of the eastern Archaic. Webb and DeJarnette note constricted base points associated with burials under an Archaic occupation of mound CT°27 in the Pickwick Basin, Alabama (Webb and DeJarnette, 1942, pl. 289, 2; pp. 235-247). Not all the Gypsum-like points in the East are earlier than the various Archaic manifestations. For example, they are found in the Stalling's Island complex, Georgia (Fairbanks, 1942).

There were other hunting complexes in the Great Basin during the later phases of Cochrane glaciation and the Anathermal in addition to the Gypsum cave. The Phase II of the Lake Mohave complex as described by Rogers may belong to the Cochrane glaciation. In addition to a percussion-flaked chopper, scraper, and blade industry there were lanceolate points and blades, and long-stemmed, snub-nosed points (Rogers, 1939, pp. 32-36; pl. 7-9). Cressman and others have described a series of complexes from the Paisley, Five-Mile Point and Roaring Rock caves in south-central Oregon, which apparently were occupied during the Cochrane glaciation (Cressman et al, 1942). The earliest complex was characterized by various types of sandals and baskets. Some of the sandals had a radiocarbon date of 9053±350.

After the climax of the Cochrane glaciation and during the Anathermal in several areas of the Southwest and Plains several complexes were prominent which had an economic tradition emphasizing food gathering. Whether this reflected a decreasing game supply caused by the gradual desiccation of these areas is unproven, but is a possibility. Various types of grinding tools and hand milling stones appear in such complexes as the Sulphur Spring Cochise and the Frontier complex variant at the Long site in Angostura Basin, South Dakota (Sayles and Antevs, 1941, pl. III; Hughes, 1949, pp. 270-271). Pestles make their appearance in the Sulphur Spring Cochise. Hunting, nevertheless, was still important, as exemplified by the large number of animal bones in the Sulphur Spring sites and the stone projectile points at the Long site. At the latter site, lanceolate points with fine oblique flaking were characteristic. It is to be noted that points of this general type were found at the Parrish site, Kentucky, apparently under Archaic cultural manifestations (Webb, Wm. S., 1951, pp. 440). It is quite possible that the desiccation of the Plains toward the end of the Cochrane glacial subphase (about 8000-7000 B.P.) caused some of the hunters who made the obliquely flaked points to move eastward.

The area of eastern United States apparently was subjected during the warm W5A cycle (Atlantic) at about the time of the Climatic Optimum, to a new stream of cultural traits diffusing from out of Asia. Among these traits were several polished stone implement types which make their first appearance in large number in the United States. These include celts and adzes in the Lamoka complex, with a radiocarbon date of 5283±250 (Ritchie, 1944, pp. 292-310; Johnson, 1951, p. 11). A rich bone industry also seemed to have been linked with these polished tools. We cannot be sure, however, that this bone industry did not date from a previous time. A wide variety of projectile points were now present in eastern United States, including side-notched, lanceolate, fishtailed based, square stemmed types. In some of the complexes the constricted stemmed points were still present. Grinding tools and pestles, found for example, in the Lamoka complex, indicate the importance of food gathering in the economy.

The temperature rise during the Climatic Optimum (Atlantic?) may have resulted in an increase in the shellfish along the Atlantic coast and in the river shoals east of the Mississippi. This may be reflected, toward the end of the subphase, in the increase of shell in the middens of eastern cultural complexes. This addition to the food supply stimulated population growth and movement and made possible a more sedentary life. This more settled life added to the rich bone and polished stone industry was basic to a large number of

complexes, called the Archaic in eastern North America, which seem to have existed during the transition between the warm, moist W5A cycle (Atlantic) and the cooler and drier W5B (Subboreal). Classic examples of the Archaic include the Indian Knoll (Webb, Wm. S., 1946), the Eva (Lewis and Kneberg, 1947), and the Laurentian complexes (Ritchie, 1944, pp. 235-268). The radiocarbon dates for the Indian Knoll site average 5302±300, and the Annis Mound of the same cultural complex, 4900±250 (Johnson, 1951, pp. 7-8). Thus, they probably overlapped in time with the Lamoka complex.

A large number of traits may have been invented in the greater area of the Southeast at this time. Among them possibly were the grooved axe, a modification of the introduced celt, tubular and conical pipes of various types, tubular stone beads, and atlatl weights. The tubular pipes possibly were derived from the almost universal shaman's tube. It is yet to be determined whether tobacco or some other herb was smoked in them at this early date.

At a slightly later time period (early W5B — Subboreal) the Laurentian complex was prominent in the central New York area, although its antecedents may have existed in the northern New England or Canada area at an earlier date. As yet no "pure" Laurentian sites have been dated, but the Frontenac site of mixed Lamoka - Laurentian origins averaged 4930±260 in its dated specimens (Ritchie, 1951, p. 130). The Laurentian complex was characterized by a large series of polished and ground slate artifacts such as the semi-lunar knife. Stone vessels were present, a trait that may have come from Asia. Grinding stones were also a feature of this complex.

In the Southwest, Great Basin, and Plains during the warm W5A cycle, the early Altithermal (about 7000 to 5000 B.P.), the climate and associated natural features were not favorable enough to stimulate greatly the development of culture. Man may have been forced out of the drier areas into better watered highlands. Others may have moved further eastward and westward. Evans has noted that in the area of Clovis, New Mexico, man was forced to dig wells during the drought associated with the Climatic Optimum (Evans, 1951). Although no cultural material was found in these wells, they may be associated with the Scottsbluff-Eden complex. The bison bones with a radiocarbon average date of 6876 ±250 from the Sage Creek, Wyoming site, excavated by Eisley and Jepsen, indicate the probability that the Eden and Scottsbluff points were made as late as the beginning of the Altithermal (Johnson, 1951, p. 9).

Before the time when the more cool and moist climate than today (the W6 — early Medithermal) began in the Southwest, Great Basin, and Plains, there was probably a phase after the heat climax when the climate was approaching that of today, referred to as the W5B cycle (5000 - 3800). The increased moisture in this phase may have been more favorable for man's occupation of this area. The Wet Leggett site, Pine Lawn Valley, New Mexico, apparently was occupied during this "transitional" phase by a complex related to that of the Chiricahua Cochise (Martin, Rinaldo, and Antevs, 1949, p. 57). The radiocarbon dates for this site are 4508±680 (Johnson, 1951, pp. 15-16). The date from Chiricahua Cochise site No. 12, Arizona is 4006± 270. The development of the Chiricahua Cochise from the Sulphur Spring complex may have occurred at this time also. The Chiricahua Cochise differs from the earlier Sulphur Spring Cochise in the technique of manufacture of some of the stone implements. In addition, a few new types are present, such as the indented base, side-notched points. Apparently the Chiricahua Cochise and its variant at Wet Leggett were more dependent on general food gathering than hunting (Martin, Rinaldo, and Antevs, 1949, pp. 58-64). Haury and Bryan refer to the possibility that the Amargosa I complex of Ventana cave, Arizona, may date slightly after the Climatic Optimum but during the time when the climate was still warm (Haury, 1950, p. 125). The Amargosa I of Ventana cave was a hunting complex, utilizing simple-stemmed projectile points. No grinding stones have been found in this complex (Haury, 1950, pp. 200-204). We cannot be sure that the Ventana cave manifestation was not a camp of hunters who at other times of the year gathered food in other areas. At the San Jon site in eastern New Mexico there is evidence that the Eden and Scottsbluff types of points were made after the Climatic Optimum, and possibly during the early part of the W5A cycle. These points were separated from a stratum containing the San Jon point (possibly a variant of the Scotts-

bluff or Eden), and extinct bison forms by a marked disconformity. The Scottsbluff and Eden points of San Jon were associated with "essentially modern species of bison." No break in the occupancy of the site since the Scottsbluff and Eden points were deposited to the late protohistoric complexes was noted (Roberts, 1942, pp. 9-10, 27). Krieger, however, is inclined to believe that the disconformity under the Eden Scottsbluff stratum dates from an earlier cycle of erosion (Krieger, personal communication).

The Clear Fork complex of Texas is believed by Kelley to have had its beginning sometime during the Altithermal (Climatic Optimum) and lasted into the protohistoric period (Kelley, 1947, pp. 107-108). This complex is described by Kelley and Ray as based on hunting and food gathering and characterized by thinned-base, beveled and triangular points; indented-base, stemmed points; beveled-stemmed points; gouges; and grinding stones. The gouges are of a type characteristic of the Frontier complex of the northern Plains (Kelley, 1947, pl. X; Ray, 1934, 1938; Holder and Wike, 1949, Fig. 67, *b-d, j*).

In the prairie area around Kansas City the Nebo Hill complex with its numerous lanceolate points that have a thick, diamond-shaped cross section may have existed during the W5 cycle (Altithermal). The lack of geologic evidence, associated with these artifacts still leaves this complex floating in time. There is the possibility that the Nebo Hill complex was associated with grooved axes, although since all the finds represent surface collections, this association is questionable (Shippee, 1948).

The return of cooler, more moist climate in the Southwest, Great Basin, and Plains resulted in the rebirth of many lakes and watercourses during the later half of the W5B cycle (3600 to 2500 years ago). This climatic change made possible a further increase in population and a reoccupation of areas made uninhabitable during the drought accompanying the Climatic Optimum (early Altithermal?). Closely correlated with the return of moist conditions in the Southwest was the introduction of corn. The earliest noted was found by Dick in Bat cave, New Mexico, and was associated with Chiricahua Cochise types of artifacts. The radiocarbon date for the level immediately above is 5931±500 (Johnson, 1951, p. 7). This particular date seems much too old for the corn, since it would mean that agriculture was introduced during the dry W5A cycle (the early Altithermal?). The original estimate of some 4000 years for the earliest corn in Bat cave would seem more probable (Wormington, 1949, p. 100). Corn was also found with Chiricahua Cochise types of artifacts in the nearby Tularosa cave (III), New Mexico, with radiocarbon dates of 2300±200 (Johnson, 1951, p. 18). Undoubtedly the combination of a favorable environment and the introduction of agriculture into the western mountain region of New Mexico permitted a more stable and larger population. Permanent outdoor houses were probably constructed at this time.

Not only did the moist climate after about 3800 B.P. permit the development and increase of agricultural complexes, but in other areas of the Southwest, Great Basin, and Plains there was probably an increase in game and vegetable products. Possibly representative hunting and food gathering complexes are the Pinto in California and its variant, the San Jose in New Mexico, and the Chiricahua-Amargosa II of Ventana Cave (Campbell, E. W. C. and Campbell, W. H., 1935; Rogers, 1939, pp. 47-60; Bryan and Toulouse, 1943; Haury, 1950, pp. 339-340). At the Stahl site in California, a component of the Pinto complex, permanent outdoor dwellings with a rectangular ground plan and pole walls were present (Harrington, 1948). The technology of these cultural complexes became exceedingly varied. Pestles of the cylindrical, conoidal, and tapered-end types were present in the Chiricahua-Amargosa II and the classic Chiricahua complexes (Haury, 1950, pp. 320-321, Fig. 76). Haury suggests that the cylindrical type with a rounded end may have been used in wooden mortars (Haury, 1950, pp. 321-324).

It is to be noted that the cylindrical and conoidal pestles were present in the Indian Knoll (Webb, Wm. S., 1946, p. 275) and the Eva complex, Tennessee (Lewis and Kneberg, 1947, p. 16). Cylindrical pestles are characteristic of the Lamoka complex of New York (Ritchie, 1944, p. 238). The butt end of a conoidal pipe was also found in the Chiricahua-Amargosa II level at Ventana cave (Haury, 1950, pp. 329-331, Fig. *79E*). Conoidal pipes are noted in the Eva complex (Lewis and Kneberg, 1947, pl. 9) and the Poverty Point complex of Louisiana (Webb, C. H., 1944, p. 387) and at the Carlson Annis Mound com-

ponent of the Indian Knoll complex (Webb, Wm. S., 1950, pp. 315-316, pl. 8A). These similarities may indicate that the conical pipe and a few polished stone artifacts already were diffused throughout the area of southern United States by about 3500 B. P. The Chiricahua-Amargosa projectile points are exceedingly varied, but consist mainly of serrated and non-serrated types with straight or expanded stem and a concave base (Haury, 1950, pl. 22). These points are common on Pinto sites in California (Rogers, 1939, pl. 13, *k-o*). Rare examples were found at the Long site, South Dakota, which predates or is in the early part of the Climatic Optimum (Hughes, 1949, Fig. 68 *s*) and in the Dalton complex of Missouri, a pre-Archaic site (Chapman, 1949, Fig. 31, 9). Several of the same type were found by the writer on valley ridge surface sites near Phenix City, Alabama.

In the northern Plains various hunting and food gathering complexes were present during the later half of the W5B cycle. Among them was the recently redefined Signal Butte IA complex, with a radiocarbon date of 3445± 120 (Bliss, 1950; Strong, 1935, pp. 238-239; Kulp, Feely, and Tryon, 1951). The dominant projectile point of this complex is lanceolate in shape. A large variety of ground stone implements and bone tools belong to the Signal Butte I level, and may reflect the westward diffusion of the ground stone and bone industry previously noted in the earlier complexes of eastern North America. That all the ground stone and bone industry described by Strong for the original Signal Butte I complexes belong to Signal Butte IA, however, seems doubtful.

During the first half of the W5B cycle, at about 4500 B. P., a stream of traits may have diffused southward along the Pacific coast. Several of these traits apparently had the same ultimate origin as some of those of cultural complexes in eastern North America. These include such traits as red ocher in graves, use of asphaltum for cement, adzes, steatite vessels, affixing beads on objects with asphalt, and quartz crystals with burials, as Haag and Beardsley have noted (Haag, 1942; Beardsley, 1948). None of these traits have been found in the Southwest-Great Basin. Shellfish also were added to the diet of the older hunting groups along the coast. The combination of the shell mounds, the traits with a possible similar origin, and a group of artifacts such as fishhooks which represent an adjustment to a similar environment results in the California coastal complex after 4500 B.P. resembling for a time those of eastern North America more closely than the intermediate complexes of the Southwest-Great Basin. The earliest of these California complexes, the Windmiller component of the Early Horizon has a radiocarbon date of 4052±160 (Johnson, 1951, p. 13), corresponding to the time before the fall in temperature at about 3800 – 3600 B.P.

In eastern North America the return of the cooler temperatures had its effect on culture, although little is known about this event. Deciduous trees retreated southward and the boreal vegetation returned in the northern areas. Possibly shellfish became less numerous, necessitating a slight re-emphasis on hunting. The various hunting and food gathering traditions continued to evolve in technological complexity. The grooved axe, tubular and conical pipes, various types of atlatl weights such as bannerstones and boatstones, and corner-notched, side-notched, and stemmed projectile points were widespread. The southward diffusion of steatite and stone vessels forms a convenient marker in the Southeast to set the late preceramic complexes apart from those that existed during the last part of the Climatic Optimum (Atlantic) and early half of the Subboreal (6000-5000 B. P.?).

The most recent preceramic North American complexes vary in time from region to region. The time period from about 2700 to 2000 B.P. in the southern part of the Southwest was characterized by the San Pedro Cochise and its variants (Sayles and Antevs, 1941). This was a derivation of the Chiricahua Cochise with a greater emphasis on hunting, characterized by long, slender, sidenotched points. The increase in game accompanying the return of the more moist climate after the drought accompanying the San Pedro erosion, may have made possible this shift in the basic economy. The variants of the San Pedro Cochise found in New Mexico, however, probably represented an agricultural and food gathering complex. Permanent outdoor houses are noted in the San Pedro complex of Arizona. These are oval semi-subterranean houses with a small antechamber and interior storage pits (Sayles, 1945, pp. 3-4). Whether these had the same origin as the later earthlodges in the Plains complexes is a problem that demands attention.

In the Southwest, pottery with an ulitmate Mexican origin was diffused into the same general area where the earliest agriculture was found a century or two before 1 A.D. Cobs and bark associated with the Pine Lawn phase of the Mogollon, the first ceramic complex of the Tularosa cave (II), New Mexico, dated 2145±160 (Johnson, 1951, p. 17). In the northern part of the Southwest unfired fiber-tempered, basket-impressed vessels were present in the Basketmaker complex by about 1 A.D. Whether these vessels were the result of independent origin or stimulus diffusion from the fiber-tempered pottery of eastern United States or from the true pottery of the Mogollon and Hohokam in the southern part of the Southwest, has not been determined. In the northern areas of the Southwest the preceramic complexes did not end until the introduction of true fired pottery into the Modified Basketmaker complex at about 700 A. D. In the Basketmaker complex a large number of elements from the previously described complexes of North America are noted. Agriculture was introduced from the south while conical pipes, tubular stone beads, atlatl weights, and dog burials may have come from the east. Baskets, cordage, sandals, and textiles may have roots in the Great Basin itself. In the later Modified Basketmaker complex, the grooved axe makes its appearance, an artifact first noted in the traditions of eastern North America that were contemporary with the Climatic Optimum.

Pottery was a new trait that diffused to northeastern North America about 3000 years ago. Charcoal from a burial associated with Vinette I pottery (Woodland II) dated 2948 ± 200 (Ritchie, 1951, pp. 130-3). Certain similarities of this early Woodland pottery to that of northern Eurasia suggests the origin (McKern, 1937). The date and origin of the fiber-tempered ware of the Southeastern complexes such as the Stalling's Island has not been determined (Fairbanks, 1942). It may be either the result of stimulus diffusion from the northern Woodland pottery or independent origin based on steatite vessels. It is to be noted that some of the fiber-tempered vessels from Alabama have chiseling marks on them in imitation of steatite vessels. In order to limit the scope of this paper, those sites in eastern United States characterized by only the fiber-tempered pottery are arbitrarily excluded from discussion.

Several conclusions can be drawn from this presentation of the North American preceramic traditions and complexes. The constantly changing climate in the past has resulted in certain shifts of population from one region to another. Certain climatic phases have been favorable for the increase of population and the development of culture, while in other areas at the same time the reverse effect occurred. This was caused by the fact that the moisture cycles of the East have not always correlated with the pluvial phases of the West. While the natural environment may lack a creative role in culture, its limiting and retarding role is of sufficient impact that we should remain skeptical of cultural studies which eliminate this factor. However, until a well-ordered and mutually accepted description of the environmental and climatic phases of North America is presented by the climatologist, the archaeologist can only make tentative hypotheses on the past relationship of culture and environment.

In the examination of the preceramic cultural complexes another important fact has been noted. Traits such as the grooved axe, tubular and conical pipes, fluted points, and dog burials which are adapted to a wide range of environmental conditions apparently diffused over a wide area of North America once they were invented on this continent or introduced from Asia. In addition, a definite progression in cultural development has occurred since man first entered the continent. The wide range of artifact types found in the Kentucky shell mounds for example indicate an increasing cultural complexity if they are compared with those from the earlier Shoop complex in Pennsylvania.

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KOLOMOKI BURIAL MOUNDS AND THE WEEDEN ISLAND MORTUARY COMPLEX

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KOLOMOKI is about six miles from the Chattahoochee River, in extreme southwestern Georgia. One of the larger southeastern sites, it covers approximately three hundred acres, including a rectangular truncated pyramidal temple mound 56 feet high, a plaza about 40 acres in extent, and 7 dome shaped mounds ranging in height from 4 to 20 feet. Three of the latter mounds have been excavated, two of which, D and E, were burial mounds and supplied parts of the data for this study (Sears, 1951b). The third excavated mound probably covered the site of a ceremonial structure and crematory area (Larsen, n.d.).

There are three distinguishable village areas at this site (Sears, 1951a), two of which are relevant to this discussion. One was arranged in a huge arc around three sides of the plaza, the temple mound taking up the fourth side. (Fig. 82). Mound D was just inside this arc at the opposite end of the plaza from the temple mound. Mound E, the second burial mound, is another five hundred yards west of mound D. It overlaps with the south leg of the arc shaped village area, and extends on in a westerly direction to a point opposite mound E.

Of the three distinct ceramic complexes isolated at this site (Sears, 1951a), we need consider only two here, since the third represents a Lamar component, and is not related to the mound-plaza complex. The two relevant complexes are:

1. The Weeden Island. Sherds are found in pits in the linear village area south of the plaza. As found here, it is a representation of the complex as isolated on the Florida northwest coast by Willey (1949). Pottery types are: Weeden Island Red, Tucker Ridge Pinched, Mound Field Net Impressed, Carabelle Punctate, Weeden Island Incised, Keith Incised, Carabelle Incised, Indian Pass Incised, a Swift Creek II Complicated Stamp (Haag, 1951) and Napier Complicated Stamp (Jennings and Fairbanks, 1939).

In the complicated stamps, the Swift Creek II variant was dominant, a type which would have been classified as late Swift Creek by Willey (1949). Napier Complicated Stamp, a type more at home in North Georgia, was of less importance, although it serves as a useful time marker. Weeden Island Incised here in the village was represented by only the "zoned" variant (Sears, 1950).

2. The Kolomoki complex, isolated and described at this site (Sears, 1951a). The majority type, almost one hundred per cent of the decorated ware, is Kolomoki Complicated Stamp, a type which would also have been classified as late Swift Creek by Willey, quite justifiably in view of the information from Georgia available to him at the time. The associated plain pottery, Kolomoki Plain, is closely related to Weeden Island Plain. Decorated types of the Weeden Island series form less than one per cent of the total decorated ware, and probably entered the midden deposits in which Kolomoki complex ceramics are found through mechanical mixture.

The two complexes are found in the overlapping, but readily distinguishable village areas noted. Since the arc around the plaza is the village area in which sherds of the Kolomoki complex are found, this ceramic complex is related to the formal temple mound-plaza-village arrangement.

I believe that the available evidence indicates the development of the Kolomoki complex from the Weeden Island. Probably the process was a general one taking place with local variations through the northwest Florida-southwest Georgia area, but, at this site, we seem to have all stages represented. The ceramic development indicated is the continued evolution of and emphasis on the complicated stamping, concurrently with the dropping of the incised, punctated, red painted, etc., wares of the Weeden Island series except for mortuary purposes. On the basis of work in the village deposits, the small amount of evidence in 1948 indicated that the Kolomoki period, as defined by the ceramic complex, was the later (Sears, 1951a). While a few Weeden Island sherds occurred in the Kolomoki period deposits, no Kolomoki sherds were found in the Weeden Island refuse pits. It is probable then that the Weeden Island material was earlier, and that the sherds found their way into the Kolomoki period deposits through mechanical mixture. As a check on this, in a typological seriation possible through the known facts of complicated stamp development in Georgia, checked by stratigraphy at certain points

(Sears, 1950, 1952, n.d.), Kolomoki Complicated Stamp is later than the Swift Creek II variant associated with the Weeden Island complex.

Further work in the Kolomoki period village area in 1951 produced material from one section of the midden deposit which verifies the conclusions above. Although complete analysis has not yet been performed, the collection of several thousand sherds obviously represents the material of a transitional period between the Weeden Island and Kolomoki extremes. A small number of sherds can be classified confidently as Kolomoki Complicated Stamp, and a roughly equal number as belonging to the Swift Creek II variant which is part of the Weeden Island complex. Most stamped sherds however are intermediate in all respects, including complexity of motifs, motifs represented, size of stamps, and number of lands and grooves used in each stamp. Associated with the stamped pottery which is dominant in the collection we find that perhaps 10 per cent of the decorated ware can be classified in the Weeden Island series, largely the incised types. On all counts, we seem to have the predicted intermediate material — the Swift Creek II stamp developing toward Kolomoki Complicated Stamp — with the Weeden Island complex types dropping out. We also found our first sherds of the small checkstamp in this deposit. Although only three or four were found, they may have some significance.

The two burial mounds excavated to date both relate to the Kolomoki period, as indicated by pottery found in them. Mound E, the first excavated (Sears, 1951a), had a central subfloor burial, consisting of the cremated remains of one individual plus two copper cymbal shaped ornaments with pearl centers and large numbers of conch shell beads. The grave, 6 feet deep, was filled with large rocks after deposition of the remains, and three other individuals were extended on the sides of the shallow pit remaining, with their heads to the east. Two trophy skulls were also placed in the pit, and a rock covered earth mound was erected over all of the burials. A final trophy skull with copper covered wooden ornament was placed on top. A few feet east of the edge of this core mound, fifty-four complete vessels and a great many sherds were placed on the

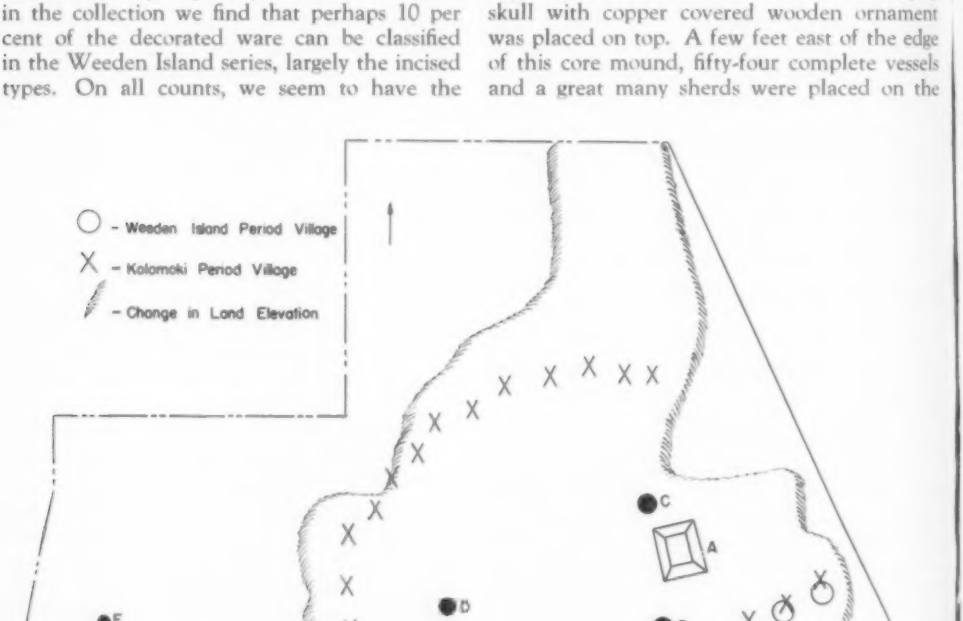

FIG. 82. The Kolomoki site.

ground surface in a mass pottery deposit. Most of the vessels were manufactured for ceremonial purposes, probably this specific funeral ceremony, and had "kill" holes cut through their bases before firing. The exceptions are some of the stamped vessels, with "kill" holes broken through. A lesser number of vessels had holes cut completely through the vessel walls as part of the decoration. Finally, a thick layer of red clay was added to finish the mound, which had a completed diameter of 100 feet and a height of 12 feet.

The important pottery types present in this deposit were: Kolomoki Complicated Stamp, Mercier Red on Buff, Weeden Island Incised, and Weeden Island Plain (Fig. 83). Mercier Red on Buff, a new type in this mound, uses two vessel forms, the commonest of which is a large globular bodied pot with short vertical neck and lip that is either flattened horizontally or is thickened by the addition of a narrow molded rim strip on the outside (Fig. 83, 6). Either the strip or the outer edge of the lip may be notched. The other form is the open bowl, which may also have the notched added rim strip (Fig. 83, 7). Either form may have semi-functional lug handles, usually four in number, in several shapes. Decoration consists of painted stripes and small solid areas, usually forming curvilinear designs. Weeden Island Incised vessels use a "free" (as opposed to "zoned" — Sears, 1950) type of incision in most cases, with motifs which are usually a variation on the birds wing theme. Several vessels are bird effigies in the round, including a fragmentary owl and a spouted duck effigy on a pedestal (Fig. 83, 5). Weeden Island Plain is found in bowls, often with raised birds head facing in from the rim, small jars, and compound forms.

Mound D, at the opposite end of the plaza from the temple mound, was larger than mound E. Diameter was over 100 feet, and the mound was about 20 feet high. It was similar to mound E in the use of a main pre-mound burial, this time in a rock slab grave, east-west orientation for extended burials, inclusion of trophy skulls, and the use of a mass pottery deposit on the east edge of the mound. However, a number of burials, apparently subsidiary to the main burial, were also in pre-mound graves, and were covered by a primary mound which in turn served as foundation for a scaffolding. The main burial was not made until this composite structure had been finished.

Over fifty other burials were part of an extremely involved mortuary complex. A number of bodies were placed in log outlines at various stages of mound construction, and attempts were made to cremate several of them in place. Numerous single skulls, presumably trophy heads, were also placed in the mound, including three in the pottery deposit on the east side. Several single skulls seem to have been buried with the skull sitting in a hand, with the forearm attached. Cymbal shaped copper and meteoric iron ornaments, pearls, and conch shell beads were associated with many burials. Other burial types included masses of bone fragments, probably basketsful, from cremations which took place outside the mound area, long bone bundles, and rock slab tombs for two females, directly in front (east) of the scaffolding, in addition to that for the main burial to one side (south) of the scaffold.

The number of vessels in the pottery deposit is not certain as yet, since many of them were thoroughly smashed, others were deposited only in part, and certainly large numbers of assorted sherds were included. Certainly the number of complete vessels is greater than was the number in mound E, and types and vessel forms were much more varied. Similarities between the mortuary ceramics of the two mounds are:

Mercier Red on Buff.

Large globular bodied vessels with vertical necks, flattened rims, and lug handles (The Mercier Red on Buff form. Also present in mound D in elaborate types with incising and white painting).

Effigies in the round, decorated with free incision (Fig. 83, 3, 5).

Effigies with built-on pedestals (Fig. 83, 3, 4, 5).

Decorative perforation of the vessel walls (Fig. 83, 3, 4, 9).

Nonceramic points of resemblance are the use of the central pre-mound burial, with what might be called "satellite" burials, trophy skulls, the mass pottery deposit on the east side of the mound, eastward orientation of burials and other features, copper cymbal shaped ornaments, and copper covered wooden ornaments (one each).

Differences in the ceramics of the two mounds are:

Lack of Kolomoki Complicated Stamp in mound D. Several stamped vessels are present, but are atypical, probably due to production for ceremonial usage.

FIG. 83. Kolomoki mortuary pottery. *1*, Weeden Island Plain, 3 dimension effigy head; *2*, Weeden Island Incised (?)flat effigy head, red paint over-all; *3*, Weeden Island Incised, free variant, duck effigy; *4*, Weeden Island Plain (?)duck effigy, red paint over-all; *5*, Weeden Island Incised, free variant, duck effigy; *6*, Mercier Red on Buff; *7*, Mercier Red on Buff; *8*, Kolomoki Complicated stamp; *9*, Type ?. Mississippian jar form, mound E-1, *5*, *6*, *7*, *8*; mound D-2, *3*, *4*, *9*.

Many exotic vessel forms present in mound D. Most of the mound E forms are also present however.

White painting used with red in mound D.

Many more effigies in mound D. They are however effigies in the round, on pedestals in most cases, decorated with free incision.

The differences then are largely in the direction of greater elaboration and specilization in mound D, and the two mounds are closely related. This relationship is further attested by the material in a midden deposit preserved under mound D, partially in place and partially scraped up into a primary mound. The pottery is a good Kolomoki assemblage, and typologically a late one. The notched added rim strip appears on several stamped sherds, and a number of stamps are practically indistinguishable from those employed in Savannah Complicated Stamp (Caldwell and McCann, 1941). Since this material was on the ground when the first burials were made in the surface to be covered by mound D, the mortuary deposit can only be contemporaneous with the Kolomoki period or later, it cannot be earlier.

The presence of Kolomoki Complicated Stamp in the mound E deposit and in a midden beneath mound D, plus the relationships between the two deposits noted above, relates these two mortuary deposits, with their specialized ceremonial pottery, to the Kolomoki rather than to the Weeden Island period, as these periods are defined on the basis of materials excavated in the village area. This is clear since the Kolomoki Complicated Stamp vessels in the mound E deposit, and the sherds in the midden beneath mound D, cannot have leaked backwards in time into closed deposits. It is certain that these vessels, in ceremonial caches, many of which can be classified as Weeden Island following present type descriptions (Willey, 1949; Sears, 1951b), were produced by a people who had abandoned such types for everyday usage through their specialization in stamped pottery. The important point here is that the culture which made the mortuary Weeden Island pottery types, which were placed in a burial mound also classifiable as Weeden Island, would not be classified as Weeden Island on the basis of ceramics found in the village area.

To me, this demonstrates rather conclusively that Weeden Island burial mounds, defined ceramically and on the basis of an east side mass pottery deposit, and Weeden Island culture, defined on the basis of ceramics in the village area, need not be related on a one to one basis. They certainly are not so related at Kolomoki, and need not then be so related elsewhere.

If my hypothesis of Kolomoki evolution from Weeden Island through development of and emphasis on the stamped ware, co-incident with the abandonment of incised, punctated, red painted, etc., types of the Weeden Island series is correct, we are dealing with a case of conservatism in certain aspects of mortuary ceremonialism. As has been pointed out many times, this is not a unique phenomenon, nor should it be unexpected in archaeological context. It does point out the need for extreme care when working with assemblages of specialized ceremonial artifacts.

The total ceramic assemblage found in Kolomoki mounds D and E enables us to demonstrate a relationship between them and a number of mounds on the Florida northwest coast. Particularly important here are the Hall, Tucker, Mound Field (Moore, 1902) and Bird Hammock (Moore, 1918) sites, clustered together in Wakulla and Franklin counties. Ceramic traits shared with the Kolomoki Mounds are:

Kolomoki Complicated Stamp (6 at Tucker, 4 at Hall, 2 at Mound Field, 2 at Bird Hammock) (documentation, Sears, 1950).

Effigies in the round with built-on pedestals and free incised decoration. Predominantly birds, often the owl.

Decorative perforation of the vessel wall. Effigies and others. These perforations probably develop from terminal pits to incised lines in Weeden Island Incised of the zoned variety.

The assemblages at these sites are directly comparable to those from the Kolomoki Mounds, both in detail and *en toto*. A further relevant point is that the Hall, Tucker, and Mound Field mounds appear to have had ramps (Moore, 1902) while one of the two mounds at Bird Hammock had a ramp (Moore, 1918).

All of these mounds have of course been classified as Weeden Island I by Willey (1949), and in view of the lack of Wakulla Check Stamp, barely into the early Mississippi period. However, since work at Kolomoki has demonstrated that the related mounds there were not produced by peoples whose culture was classifiable as Weeden Island on the basis

of their everyday ceramics, we are justified in at least the suspicion that these Florida mounds too may have been produced by non-Weeden Island cultures. Thus they may be later than Weeden Island I.

At this point, it is necessary to place this Kolomoki-Florida northwest coast mortuary complex in time and cultural development. Relevant points, using terminology and classification derived from both Ford and Willey (1941) and from Griffin (1940) are:

1. At Kolomoki, the mortuary complex relates to the village area which is part of the formal mound-plaza-village arrangement. Such arrangements, as distinguished from less formal setups without heavily occupied village, are classified as Temple Mound II (Ford and Willey, 1941).
2. The Mercier Red on Buff jar shape, flattened lip, free hand red painting, and red and white painting (mound D only) are also characteristic of the Temple Mound II period (Ford and Willey, 1941).
3. The notched added rim strip found on the Mercier type and on several sherds in midden association is also late. Dallas (Lewis and Kneberg, 1941) and Moundville (Moore, 1905) are two complexes in which it occurs with some frequency, and, to the best of my knowledge, the feature is never found on ceramics from an early Mississippi context.
4. Free incising appears to be definitely Mississippian as opposed to the zoned middle Woodland usages.
5. Effigies modeled in the round elsewhere in the southeast do not appear until after early Mississippi.
6. Many effigies are of the owl, which as a decorative motif also appears elsewhere after early Mississippi.
7. In the total outline of Complicated Stamp development in the South Appalachian province, as known so far, Kolomoki Complicated Stamp falls, on typological grounds, right under Savannah Complicated Stamp (Caldwell and McCann, 1941) and its relatives (Sears, 1952 and MS). These latter appear just after the Etowah series in north Georgia (Wauchope, 1948 and 1950, Sears, 1952 and MS). This then places the Kolomoki type as at least partially coeval with the Etowah series, the ceramic diagnostic of the peak period of the southern cult at the Etowah site.
8. Copper covered wooden ornaments, usually considered as ear ornaments, are considered to be late Mississippi (Ford, 1951). The same appears to be true of the cymbal-shaped copper ornaments.

In the over-all southeastern picture then, this southwest Georgia-northwest Florida assemblage relates to fully developed Mississippian culture, a period which might be called mature Mississippi (Sears, 1950, 1951b, 1952). This period would fall after the development of the Mississippian culture type in early Mississippi (Griffin, 1946), exemplified by such manifestations as Hiwassee, small log Town House, Macon Plateau, and so on. Following mature Mississippi we have the late Mississippi or protohistoric period of ceremonial and artistic decline, the Lamar period in Georgia.

To summarize, two Weeden Island type burial mounds at Kolomoki contain mass pottery deposits composed in large part of vessels classifiable as Weeden Island types. These mounds were built during the latest culture period at this site, the non-Weeden Island Kolomoki period. These two mounds are related to a number of burial mounds on the Florida gulf coast which have been classified as Weeden Island I (Willey, 1949). Since the related Kolomoki mounds were produced by a culture not classifiable as Weeden Island on the basis of the ceramic complexes characteristic of the village deposit, in a time period later than Weeden Island I, it is possible that a similar situation obtains for the Florida mounds. Certainly Kolomoki demonstrates that the small checkstamp does not invariably serve as a late time marker. I doubt that it serves this function in at least the Wakulla and Franklin county sections of the Florida northwest coast, although it may in other parts of the coast. It does seem to work in peninsular Florida however.

In closing, it should be pointed out that Mississippian in this discussion refers to a culture type and to the time period in which it flourishes. Although there are Mississippian elements in the ceramic complexes which have been discussed, these complexes are basically a part of a coastal ceramic province extending west to east Texas. Developments in this province are distinct from those taking place inland, although there is obviously interaction at various times and places with the ceramic traditions of neighboring provinces, as middle Mississippi and the stamped ware of the South Appalachian province.

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University of Georgia
Athens, Georgia
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EXCAVATIONS IN JAMAICA

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THE PURPOSE of this paper is to report the results of excavations conducted in 1933, as yet unreported, and to correlate the findings with present knowledge of Jamaican and other West Indian prehistory. Descriptions of the sites and specimens may be of value to archaeologists in this area.*

Since 1933 great strides have been made in archaeological knowledge of the West Indies. Irving Rouse has correlated known cultures in most of the Greater Antilles and in some of the Lesser Antilles. He has established seven arbitrary time periods, I, IIa, IIb, IIIa, IIIb, IVa, and IVb, for the area (Rouse, 1939, 1941, 1948, 1951, 1952) on the basis of stratigraphy, seriation of modes, establishment of style sequences, and cross-dating of trade objects. During these periods four cultures existed. The period I culture is preceramic and is associated with the Ciboney Indians who may have come from North America. The first ceramic culture, Igneri, is associated with the Arawak Indians, who pushed north and east from the Orinoco Valley in period II. It lacks the ceremonial complex which distinguishes the two later ceramic cultures, sub-Taino and Taino, which developed in the Greater Antilles during periods III and IV, the former as a simpler variant of the latter.

The period II ceramics in the Greater Antilles are so similar to the contemporaneous pottery of the Lesser Antilles and the Lower Orinoco that they have been grouped together as the Cuevas horizon style. (Cuevas was called "Crab Culture" by Rainey, 1940.) These potsherds are fine and thin. In profile the bowls are sinuous with an outward flare. Ribbon handles, the majority D-shaped, and plain, tabular lugs are characteristic. Red paint is applied to areas such as the lip or lug. Striking white-on-red designs occurred in period IIa but are uncommon. Incised sherds are rare (Rouse, 1948, p. 511; 1951, p. 255).

In periods III, a and b, Rouse (1951, p. 256) has defined four ceramic styles: Ostiones, Santa Elena, Meillac, and Bani. Ostiones and, to a lesser extent, Santa Elena, both Puerto Rican styles, reflect Cuevas influence which becomes less distinct late in the period. Early Ostiones sherds retain such characteristics as painting or polishing of restricted surfaces but bowls are straight-sided instead of bell-shaped and handles looped rather than D-shaped (Rouse, 1951, p. 256). Incision is common. Paint is rare and, if used, covers all surfaces.

Meillac in Haiti and Bani in Cuba are alike and contrast with Cuevas. The ware is coarse and poorly made, and shapes are not graceful. Incision and modeling are the favorite forms of decoration (Rouse, 1951, p. 257).

In discussing this middle Arawak culture (period III) in the Greater Antilles, Rouse points out that ceramic styles "tend to cluster around the passages between the islands rather than the islands themselves" (Rouse, 1951, p. 260). For example, Ostiones pottery of western Puerto Rico is much like that found in the Dominican Republic. Thus he sets up three areas: the Vieques Sound Area to the east, the Mona Passage Area in the center, and the Windward Passage Area, which includes Jamaica.

In periods IVa and IVb, five new styles are defined by Rouse (1951, p. 258). Boca Chica, the most elaborate, is the key style, of which the other four are variations. Carrier is the Haitian variety. Throughout this period, ball courts and other ceremonial structures and artifacts appear, especially in Puerto Rico and the Dominican Republic, which were the centers of Taino culture.

Rouse has studied and correlated Jamaica collections in this country and Europe but has done no field work in Jamaica. R. R. Howard, in 1949 and 1950, made a thorough survey of Jamaican material in collections, did some collecting himself, and reached the conclusion that until stratigraphical excavation is done in Jamaica no final conclusions can be made concerning pre-Columbian cultures of that island (Howard, n.d., pp. 155, 160). Jamaican cul-

* Materials recovered were given to the Museum of the American Indian Heye Foundation. The staff has been most cooperative in allowing us to restudy and photograph the Jamaica specimens. The photographs were taken by Stephan Williams of the Department of Anthropology, Yale University. We are indebted to him, but above all to Doctor Irving Rouse of the Caribbean Program, Department of Anthropology, Yale University, whose perceptive criticism and continuing assistance made this paper possible.

ture certainly belongs to the sub-Taino group, with its less developed ceremonial complex than the Taino. The pottery is locally variant from, but generally resembles Meillac in Haiti (Howard, n.d., p. 155) and Baní in Cuba (de Booy, 1913, p. 432). Howard (n.d., pp. 136, 145) identifies only one other ceramic division in Jamaica, a sub-style which he calls Montego Bay.

There is no stratigraphical evidence to place the culture and ceramics of Jamaica on the time scale, but Howard draws certain tentative chronological conclusions. No evidences of preceramic Ciboney cultures of period I, such as Couri in Haiti or Coroso in Puerto Rico, have been found. The Cuevas horizon style of period II, has not been reported from Jamaica. There is no known evidence of Carrier, or of other ceramic styles of period IV. Hence, the only cultural and stylistic units recognized in Jamaica, sub-Taino culture, the Jamaican Meillac style of pottery, and the Montego Bay sub-style, fit into period III and appear to have continued basically unchanged into period IV.

The material collected by us verifies the existence of the Jamaican Meillac style and Montego Bay sub-style and, in addition, indicates the presence of an hitherto unreported, Puerto Rican like style. Our material comes from three sites, Little River, Little Nigger Ground Hill, and Windsor (Fig. 84) which we shall discuss in turn.

Little River Site

Little River middens are located at the mouth of the Little River, a small stream halfway between Roaring River and Maumee Bay (Fig. 84). At this point there is a narrow strip of flat land between sea and plateau. These middens are on the east bank of the Little River, where it enters the sea. The site was not mapped. Land crabs had carried potsherds from their holes, calling our attention to the site. The largest midden, about two meters high, was half washed away by the sea at that time and may well be completely washed away by now. From this bank a sample of about 225 sherds was taken. Only 31 were saved.

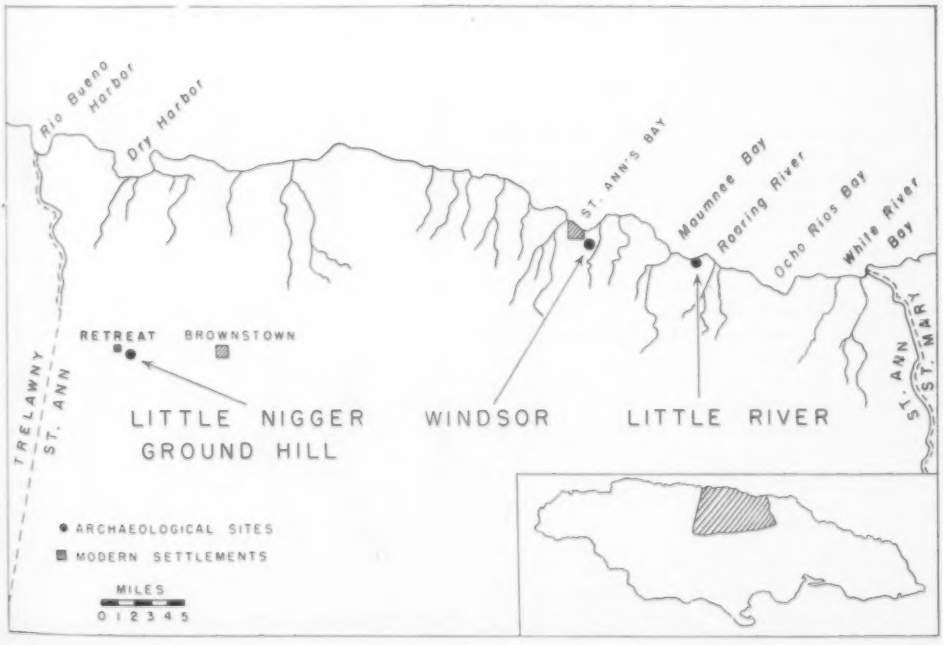

Fig. 84. Sites in St. Ann Parish, Jamaica.

The Little River collection of sherds (31) is too small to warrant statistical study. However, the prevalence of certain modes and lack of others strongly indicates that these sherds belong to a style under Puerto Rican influence and not to Jamaican Meillac. We present first a general description, next specific examples, and then a comparison with Jamaican Meillac and with the Cuevas and Ostiones styles of Puerto Rico.

At Little River there are two kinds of cooking pottery: griddles (burens) and other vessels. Little River griddle sherds are 2.2 cm. thick, made of coarse ware, rubbed smooth on top. Hardness on March's (1934, p. 20) Moh scale is 2.5 - 3.0. These characteristics are typical of most West Indian griddle sherds, which do not differ materially from culture to culture, presenting few diagnostic clues. Their presence is important, however, in that it indicates cassava as a food and, therefore, an established agriculture. There are 26 sherds from cooking pots. The ware is medium fine grained with the exception of one coarse-grained sherd. Only 5 are completely fired through, the others showing a dark, softer center at the fractures. Firemarks are seen on 9 sherds. Half of the sherds are 2.0 - 2.5, half 2.5 - 3.0 on the hardness scale. The sherds have a dull ring. There are intrusions in the clay, which seem to be natural. Clay color varies from shades of brick red through salmon to light yellow tan with six examples of oyster grey. Most of the sherds are small and thin, averaging 0.5 cm. in thickness with variations from 0.4 to 0.7 cm.

Shape of the vessels is difficult to determine from the majority of the sherds, which are small, but there are examples of oval, boat-shaped, and, probably, of hemispherical vessels. Some sherds are from shallow bowls. The bodies of the vessels rise fairly straight or turn inward slightly at the shoulder. There is no example of outward flare. There is definite taper from rim to lip in the 17 rim sherds. Fifteen sherds taper down from a thickness of 0.5 to 0.3 or 0.4 cm. (Fig. 85, *c*). In distinguishing between lip and rim we are following Rouse's (MS) analysis of Cuevas potsherds. Lips are rounded or flat with only three examples of slight inward bevel (Fig. 85, *h*). One lip rounds outward with a slight flare (Fig. 85, *b*).

Decoration of our Little River sherds is largely confined to handles and lugs and to surface treatment. We obtained four handles attached to vessels (Fig. 86, *a*, *c*, *f*) and a fifth broken off. These vary in length from 5.2 cm. to 2.0 cm. The largest is D-shaped, when viewed in profile, and was attached to an oval shallow pot (Fig. 86, *a*). It is graceful with smooth flowing lines. Two others are D-shaped (Fig. 86, *f*), and the remaining two looped, i.e., they rise above the rim of the vessel (Fig. 86, *c*). The ware of four of the handle sherds is medium fine, the fifth coarse. Two have been rubbed smooth. There are no lugs or painted areas on these sherds. One handle, the smallest (Fig. 86, *f*), is slightly indented or ridged, with raised edges. This sherd appears to be from a miniature pot, which was 2.0 cm. deep. Such miniature or paint pots, known from other islands, have not previously been reported from Jamaica (Howard, n.d. p. 155).

There are four examples of lugs, three of which are amorphous and one an incised tab. Two of the amorphous lugs are crude nubbins placed above the angle of the shoulder. One of these was made by thumb pressure and is crescent shaped (Fig. 86, *e*). The third is on the keel (Fig. 86, *h*). The tab lug is badly worn, its surface peeling and cracked (Fig. 86, *j*), but was in better condition when collected in 1933. It is lightly incised with three radiating lines and has flecks of red paint near the edge. One sherd (Fig. 86, *b*) has a curving, narrow, molded strip on the side wall. It is not in high enough relief to be considered as a lug.

The other main form of decoration consists of paint and rubbing applied to areas of the vessel surface. Eight sherds are painted, seven of them red. Four are spotted haphazardly with red. One of these has in addition, a

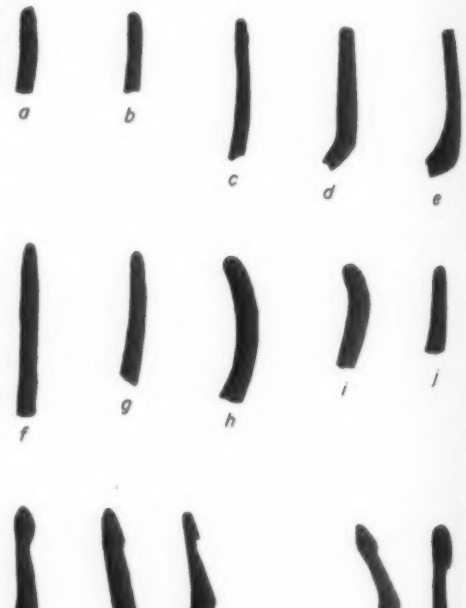

FIG. 85. Rim profiles of pottery from St. Ann Parish, Jamaica. *a-j*, Little River; *k-m*, Little Nigger Ground Hill; *n*, *o*, Windsor.

hair line of red on the flat-topped lip (Figs. 85, *a*; 86, *g*). This sherd is well rubbed on the inside but rough outside. Three sherds are painted red in certain areas. One of these is the best molded of the amorphous lug sherds (mentioned above), painted light red on the lug and above the shoulder inturn (Fig. 86, *h*). One small sherd is painted outside from rim to shoulder in a streak 3.5 cm. wide. The remaining 2.0 cm. of the sherd is unpainted tan clay. The third areally painted sherd is the one with the curving ridge, described above. This is painted brown red above and below the ridge (Fig. 86, *b*). The eighth painted sherd has a yellow band about 0.6 cm. wide on the inside from the rim to the bottom break. The rest of the sherd is well-rubbed, medium brick red with firemarks outside.

None of these sherds are polished. They do not reflect light. Twenty-one are well rubbed on one or both sides. They are not scraped since intrusions at the surface have not been forced in the center. Rubbing gives the sherds a dull mat finish, which is pleasing. Sometimes one area is rubbed to enhance a particular feature, perhaps the handle, but usually the whole surface is treated. Areally painted sherds are rubbed over the paint. Paint-flecked sherds are not rubbed at all. The only example of incision is the tab lug mentioned above (Fig. 86, *j*). Since it is fairly certain that sherds discarded were not incised, this incised sherd is probably the only one in about 225 sherds examined. This is a low incidence of incision.

To summarize, even a cursory study of this Little River group of sherds shows certain characteristics in common. These are: curvature of the surface; simplicity of decoration; ware medium fine grained but poorly fired; color, reds, tans, and greys; average thickness 0.5 cm.; shape, open bowls with some flat bottoms; shoulder, straight or incurving; rim, tapered to the lip; lip, rounded or flat; D-shaped handles, amorphous and tab lugs; some painting and rubbing of restricted areas.

How do these traits compare with those of two established styles in Puerto Rico and one in Jamaica? Cuevas, the earliest style in Puerto Rico, has many traits in common with the Little River group. The high incidence of D-shaped and loop handles and the presence of red paint, are Cuevas characteristics. To be sure, Little River painted sherds resemble only the crudest examples of Cuevas painting, and loop handles are characteristic only of late Cuevas. Cuevas material also includes the Little River type of amorphous lugs. (They are not, however, the favorite Cuevas type of lug.) The fact that incision is rare further links Little River to late Cuevas (period IIb). The slightly tapering rims of Little River are similar to one-third of all Cuevas rims, a higher proportion of which are from the west and south Puerto Rican coasts (Rouse, n.d.). Hardness and thickness of both groups are the same.

The Cuevas modes found at Little River are those which continued to be popular in the early Ostiones style of Puerto Rico. On the other hand, the sinuous profile, outward flare, and white-on-red painting of Cuevas are not found either in early Ostiones or in the Little River artifacts. The ware at Little River is not fired as well nor polished in the Cuevas tradition and this is also true of Ostiones. Neither Ostiones nor Little River sherds, for example, "ring like fine porcelain" (Rouse, 1952). Little River also lacks the traits characteristic of late Ostiones, such as incised designs on the vessel wall and modeled "bat-head" lugs. Thus, it seems closer to early Ostiones than to either the Cuevas or the late Ostiones style.

There is a subtle resemblance between Cuevas-Ostiones and Little River difficult to pin down. Our original field notes written with no knowledge of the Cuevas material state "from an artistic point of view this lack of decoration is more than offset by the simple beauty of graceful and flowing line." Rouse (n.d.) comments in the same vein, ". . . the Cuevas sherds have an appearance of sleekness. This is true not only of the vessel walls, which are well rubbed and polished, but also of the lugs, handles, and other features of decoration which seem almost sensuous in their smoothness and simplicity."

The contrast between Jamaican Meillac and Little River is sharp. D-shaped and looped handles and paint are not present in Jamaican Meillac, nor are flat bottoms. The Meillac sherds are thicker and have thickened rims or rim ridges. Although Jamaican Meillac has a lower percentage of incised and affixed decoration than has Haitian Meillac, this percentage is far greater than Cuevas, early Ostiones, or Little River. Variations in thickness and curvature of the surface are uncommon in Jamaican Meillac. The most marked similarity between Little River and Jamaican Meillac is that both styles lack outward flare and both are poorly fired.

It must be borne in mind that the Little River group is so small that comparison with established styles can only be considered interesting and indicative, not in any way conclusive. Yet, while Little River cannot be es-

tablished as a distinct style nor placed accurately in the time scale, it does appear to be an extension of the Cuevas-Ostiones stylistic tradition and will probably be eventually dated early in period IIIa. By this period in Puerto Rico, Cuevas pottery had developed into early Ostiones (Rouse, 1952). The diffusion, if diffusion it be, from Puerto Rico to Jamaica probably took place early in the development of Ostiones forms and certainly well after the peak of period II, when polychrome pottery flourished, since sherds of such pottery are not seen at Little River. There are no examples of Little River pottery comparable to the best of the Cuevas period.

The artifacts other than pottery found at Little River are not diagnostic. One deep grey flint scraper, and five flint pieces, patina white, all have worn edges. The absence of ceremonial artifacts points to the Igneri division of Arawak culture, as in the supposedly contemporaneous sites of Puerto Rico.

Two bones were collected from the Little River midden. One was identified by the American Museum of Natural History as probably goat or sheep leg bone, but has been catalogued by the Museum of the American Indian as a fragment of human bone. It is 10.0 cm. long and has a hole bored into the "knuckle." It was embedded in yellow earth, in which some sherds, including the smallest handle, were found. The yellow earth is at the edge of the midden, the main part of which is formed of black earth. This yellow strata is on the Little River side of the midden and could have been deposited by the stream in flood. At the same time the outer part of the midden could have been disturbed and redeposited containing the recent bone. The second bone was identified as *Pseudoscarus* or *scarus* (parrot fish).

There were few shells in this midden, a much lower percentage than in the other two middens to be reported. Comparatively shell-free middens are characteristic of Igneri culture in Puerto Rico, as is also the location of the Little River site near the shore (Rouse, 1952).

Little Nigger Ground Hill Site

The site excavated at Little Nigger Ground Hill, Retreat Pen, near Brownstown (Fig. 84), is 6 miles inland at an altitude of 1200 feet. This site had been mapped, excavated, and described in 1913 by de Booy (1913, p. 427). Previously, in 1896, Duerden had collected there and before him, Barrett (de Booy, 1913, p. 426). In 1933, the owner, Mr. Alexander Ranby-Smith, was most cooperative in allowing us to run a trench through a midden not excavated by de Booy. On the eastern brow of the hill, it lies between No. 6 and No. 7 on de Booy's chart (1913, p. 427).

A trench two feet wide and fifteen feet long was cut through from east to west. Ten feet from the eastern edge ashes were found and the trench widened to a circle about five feet in diameter. Here were the richest finds. In cross section there was a two-inch layer of sod, a six to eight inch layer of dark earth, and a two-foot layer of dark earth and shells upon undisturbed light earth. Potsherds were found throughout the first three layers. Of those found, 77 sherds or between five and ten per cent were kept.

The potsherds match those found by de Booy (1913, Pls. 32, 33). Griddle sherds, boat-shaped vessels, a face handle (Fig. 86, *o*), applied strips (Fig. 86, *k*), incised lugs (Fig. 86, *p*), and ridged rims (Fig. 86, *l*) are represented. The only mode which de Booy found examples of at this site and we did not is the zoomorphic lug handle.

Since Jamaican Meillac of this type has been frequently described and is well established as a style (Howard, n.d., pp. 135 ff.), it would not be profitable to go further into the modes represented in this group of sherds. However, two atypical sherds will be mentioned. One shows a new type of punctuation for Jamaica, like that from Diale, Fort Liberté, Haiti, which Rouse (1941, Pl. 13:10; p. 71) says probably was made with cane or bird bone. The other sherd is incised in an irregular fashion with a design like that seen on two sherds on exhibition at the Museum of the American Indian, labelled "Cuban."

The objects other than potsherds are also, with the exception of the crocodile pendant described below, generally typical of Jamaican Meillac sites. Of the hundreds of shells only three were kept. These were identified by the American Museum as *Pleurodonta bainbridgei* (Pfeiffer) and *Pleurodonta jamaicensis* (Gmelin). De Booy (1913, p. 431) found other species of *Pleurodonta* but has not listed these. They are so uncommon that the American Museum of Natural History added our specimens to their shell collection. Howard (n.d.,

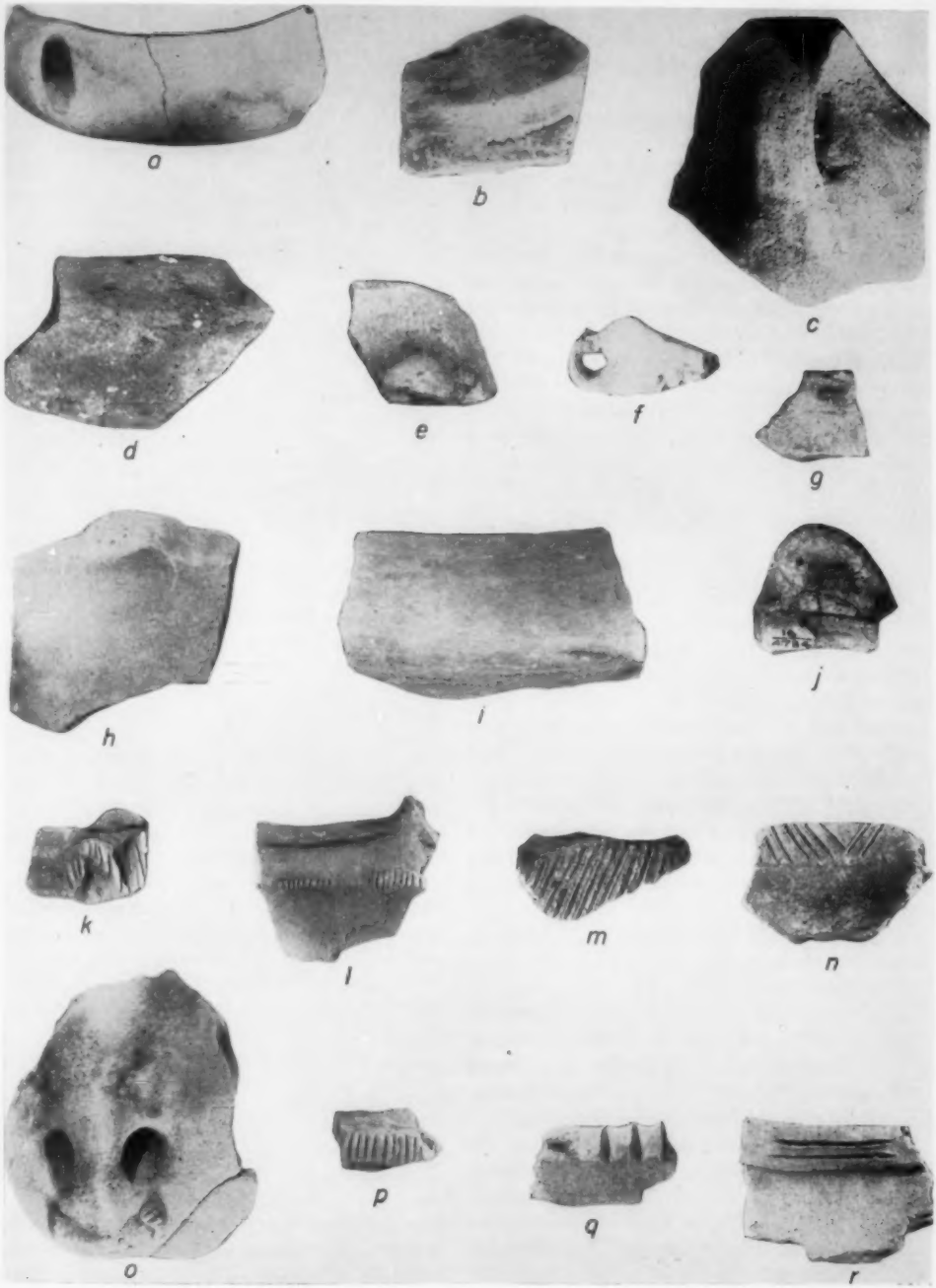

Fig. 86. Potsherds from St. Ann Parish, Jamaica. *a-j*, Little River; *k*, *l*, *o*, *p*, Little Nigger Ground Hill; *m*, *n*, *q*, *r*, Windsor. (Scale varies.)

pp. 124-5) does not include the first species in his list of shells found in Jamaica middens. The second is listed by him as *Helix jamaicensis* (Gmelin), the former designation. Shell identification lists should be rechecked in light of modern classification.

The bones were unidentified fish vertebrae and bird and animal bones. The few collected were identified by the American Museum as *Geocapromys brownii* (coney) and the tooth of a crocodile (*? acutus*). This tooth has been drilled and was probably used as an ornament. It is broken off at the hole and most of the enamel has gone. It is not surprising to find crocodile remains. Crocodiles abounded in the lagoons around West Harbour in 1897 (McCormack, 1897, p. 448). They exist in rivers today but their numbers are diminishing (Howard, n.d., p. 23). Crocodile bones have been found in mounds at Portland but teeth are not mentioned.

Ornaments of any sort from prehistoric Jamaica are rare. The Lady Blake collection includes some quartz beads (Cundall, 1894, p. 68). Howard (n.d. pp. 117-18) mentions among stone ornaments, two marble amulets, some chalcedony beads, other beads of greyish-white stone, and a small quartz ornament. The only shell ornaments reported are 32 shell beads of *Oliva reticularis*. This is a short list. Howard (n.d., p. 126) states that none of the bone material "seems to have been utilized in the technology in any way." Thus, if this is a pendant, it is the first such ornament found in Jamaica.

Pendants made of bone are reported from other islands by Rouse. Pendants made of the incisor of a dog and of some other mammal have been found in the Maniabón Hills, Cuba (Rouse, 1942, p. 143). A ray fish bone pendant comes from a Carrier site in the Fort Liberté region of Haiti (Rouse, 1941, p. 149; Pl. 26:23). There are tooth pendants exhibited in the Museum of the American Indian, labelled St. Vincent, which may be crocodile. These are the only reported West Indian tooth pendants known to the author, a fact which indicates that the Little Nigger Ground Hill crocodile tooth pendant is not only atypical for sub-Taino culture in Jamaica but is rare throughout Taino and Igneri cultures as well.

Windsor Site

The third site excavated by us is at Windsor, St. Ann's Bay, St. Ann County, then the property of Mr. A. Constantine Goff, who at that time ran a small hotel. Here, on a hill overlooking the sea about a mile inland and half a mile east of St. Ann's Bay, is Fort Windsor, a rectangular earthwork and trench built by the British in 1803 (Cundall, 1915, p. 320). About ten yards from the fort is a hole cut into the rock which widens into a beehive-shaped chamber about ten to fifteen feet deep. This cistern-like cave closely resembles one in Barbados, "Indian Castle," described by Fewkes (1922, p. 85) and considered by him a possible Indian excavation. A rectangular rock excavation at Freshwater Bay, Barbados, also is reported by Fewkes. This, like the cistern hole at Windsor, is built near an English fort. Fewkes' chief reason for believing these to be Indian is that they have been so attributed as early as 1750. Possibly these excavations were dug by Indians, but if so, it is likely they were working under white supervision. Such projects are not encountered in Arawak culture.

Middens on this hill and hillside covered several acres and had not previously been excavated. The middens reported by C. S. Cotter to Howard (n.d., p. 146) and called Windsor may be the same middens but if so the location is not given correctly. Partial excavation of a midden, test holes, on the western brow of the hill was made at the point where the hill falls sharply to a steep walled ravine. No stratigraphical record of finds and no mapping was done. Potsherds were frequently encountered near the ashes of former fires. Shells were abundant and bones and worked stones present. Of the potsherds found about five per cent (28 specimens) were collected.

The potsherds from Windsor site are in the Jamaican Meillac tradition but have characteristics of Howard's (n.d., pp. 145-6) Montego Bay sub-style. Twenty-six sherds are from pots and one from a griddle. The ware is coarse and not well fired (only eight are fired through). On the hardness scale the sherds measure about half 2-2.5 and half 2.5-3.0. One sherd clearly shows the coiling process by which it was made. Three courses of coils are easily distinguishable. The thickness of the sherds varies from 0.5-1.0 cm.

The shape of the Windsor vessels cannot be clearly visualized from the small sherds, many of which are flat. There are two keel sherds, one angular and one curving, both inturned. There is one example of twisted rim, a mode not previously reported from Jamaica. Twisted rims are found in Puerto Rico among Ostiones sherds (Rouse 1952). They are not diagnostic of Haitian Meillac.

Of the seventeen rim sherds, fourteen have reinforced rims in typical Meillac fashion. The remaining three rims are plain.

There are eight incised sherds. This is the group which sets the Windsor sherds apart from Little Nigger Ground Hill and other Jamaican Meillac. Howard's sub-style, Montego Bay, has a high incidence of similar incision. These eight sherds are 0.5-0.8 cm. in thickness. Four are incised on the rim area (Fig. 86, *r*). Of these, three designs are broken parallel lines and the fourth curvilinear parallel lines similar to Howard's (n.d., Pl. 3:6) specimen. One sherd is incised with twelve closely spaced parallel lines (Fig. 86, *m*). A keel sherd is decorated with alternating oblique parallel lines (Fig. 86, *n*). The incision on all these sherds is deep (about 0.1 cm.) but narrow. The rough edges burred by the tool have not been smoothed off. As Howard (n.d., p. 146) points out this sort of incision is not characteristic of Jamaican Meillac. At Windsor incision occurs more frequently than in the usual Jamaica style.

Lugs are less diagnostic of this subtype than is incision. Two lugs are present in this group. One is a small cleat lug on thin hard pottery typically Meillac. The other fits better into Montego Bay sub-style. It is a ribbon lug, deeply grooved perpendicularly (Fig. 86, *q*).

Two sherds are of massive ware, 1.0 cm. thick and reddish tan in color. Since one is a fragment of the bottom of a pot and the other a body sherd, probably below the keel, it is not surprising that they are undecorated. Sherds as thick and heavy as these are reported by Howard in the Montego Bay sub-style.

The few shells collected were identified by the American Museum as *Pleurodonta acuta* (Lamarck), *Pleurodonta jamaicensis* (Gmelin) and *Cokakia tigerina* (Lamarck). None of these is in the Museum of the American Indian.

Of the bones from this midden, one, a fish bone, is in the collection. Bones of a lizard and coney bones, mentioned in the field notes, were collected but have gone astray. Two stone chips in the Museum of the American Indian collection are of little interest.

We also obtained from the Windsor Pen overseer a stone head, 6.0 cm. high, perhaps a pestle handle. His son had found it in a stream bed below the hill where the middens are located. This head is still in our possession. It is reminiscent of a cruder pottery head in the Institute of Jamaica (Howard, n.d., Pl. 3 *a*, *b*). The circle outlining the eye is also seen in a specimen from El Mango, Maniabón Hills, Cuba, a sub-Taino site (Rouse, 1942, Pl. 7, *L*). Such a surface find has no value in solving problems of chronology and sequence but this example is of such high quality of artisanship that it is interesting in itself. If the product of a local craftsman, it bolsters Peter Martyr's statement that the inhabitants of Jamaica were better craftsmen than inhabitants of the rest of the Greater Antilles (Joyce, 1912). No one would attempt to uphold such a statement with material now known from Jamaica.

Conclusions

The three sites discussed above, Little River, Little Nigger Ground Hill, and Windsor, when considered in the framework of Rouse's (1951) recent synthesis fall into three time periods.

Little River artifacts are Ostiones-like and are therefore the first indication of Arawak presence in Jamaica during the earliest part of period IIIa (estimated to date from the thirteenth century, A.D.). Since the style is unmixed with others, the specimens are not believed to be trade sherds. Thus we see that influence from Puerto Rico extended to Jamaica either early in IIIa or, if Little River is a survival, later in period IIIa. It is even possible that it coexisted with Jamaican Meillac.

Sherds from the Anadel and San Juan sites in the Dominican Republic are also Ostiones-like (Rouse, 1951, p. 256). In Haiti sherds of the same style have been found mixed in with the earliest Meillac pottery (Rouse, 1941, Pl. 25: 18-25). Rouse (1951, p. 257) assumes that these specimens "mark the extension of the original Arawak migration westward from Puerto Rico at the expense of the Ciboney."

It would thus seem that the Ostiones style of period IIIa formed part of a horizon extending through the Greater Antilles, except for Cuba. If so, it cut across the three culture areas proposed by Rouse (1951, p. 261), namely the Windward Passage, the Mona Passage, and the Vieques Sound Areas.

The two other sites, Little Nigger Ground Hill (Jamaican Meillac) and Windsor (Montego Bay sub-style of Jamaican Meillac ?) offer examples of traits which are common to the Windward Passage Area in period IIIb (estimated to date from the fourteenth century, A.D.) and period IV (proto-historic). The specimens, which show no Puerto Rican traits, are in sharp contrast to the Little River specimens. They are closely related to Meillac in Haiti and Baní in Cuba. Rouse's concept of the Arawak as a sea-oriented people, easily communicating between opposing coastlines of adjacent islands, is well illustrated here.

Further survey and stratigraphical data are urgently needed in Jamaica.

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THE BINTZ SITE*

HOWARD A. MACCORD

THE BINTZ SITE is a small village site** located on the left bank of the Ohio River at the mouth of Twelve-Mile Creek, Campbell County, Kentucky, on property belonging to Mrs. William C. Bintz. The village consists of two parts — the "lower village," at the immediate edge of the river, just downstream from the mouth of the creek, and the "upper village" about two hundred meters from the river and the creek on a terrace about four meters higher than the flood-plain where the "lower village" is located (Fig. 87). The cultural material found at both areas is identical, and it appears that both areas were occupied by the same people and at the same time. With the exception of a small amount of Woodland material found on the surface and in the excavations at the "upper village," all the material is definitely of the Fort Ancient type. Since the pottery types link the site specifically with the Madisonville and Fox Farm sites, we classify the Bintz site as a component of the Madisonville focus (Griffin, 1943).

THE UPPER VILLAGE

Construction of the Mary Inglis Highway in 1938 uncovered 7 burials and considerable midden material. The skeletal material and artifacts found by the construction workers are now in the cabinets of local collectors, or are lost. Surface indications on the terrace reveal a village area of about two acres with a few outlying house-sites near the Bintz home and barns. Mrs. Bintz states that excavation of foundations for one of the outbuildings near the house uncovered several well-preserved skeletons, but no other data could be elicited. The upper village is now under cultivation, except for a small pasture, in which no excavations were permitted. The surface of the terrace is rolling and affords excellent drainage. Potable water was formerly available from several springs, now dry, which lie just west and south of the occupied area.

Permission to excavate was obtained from Mrs. Bintz and from William Graden, lessee of that part of the farm on which the village lies. It was desired to excavate a strip across the center of the village in order to obtain a cross-section of the midden deposit and to sample the cultural detritus. Accordingly, a trench 2 meters wide by 15 meters long was dug in what appeared to be the center of the village area. Excavation was done in units of one square meter, in order to reduce earth handling to a minimum. The sub-soil in each square was carefully examined for pits, post-molds or other disturbances. Occasionally, tests were sunk into the undisturbed hardpan to assure ourselves that we were safely below cultural deposits.

Excavation of the test trench revealed the mantle of refuse filled black earth over the hardpan to be from 25 to 60 cm. thick. Hardpan was uniformly a dense brown clay resulting from the decay of the local fossiliferous limestone. The plowed zone was usually about

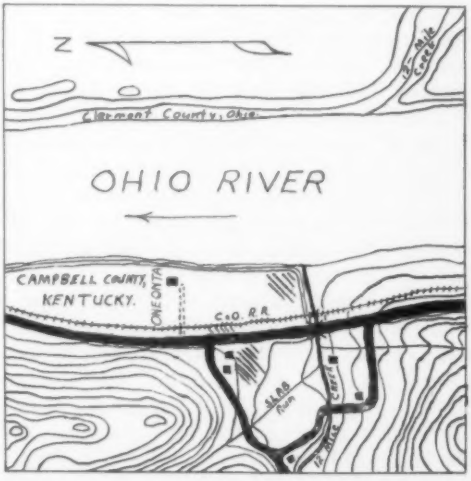

FIG. 87. Bintz site and vicinity.

* Excavations at the Bintz Site were conducted as a spare-time project by the following members of the Kentucky Archaeological Society, Northern Kentucky Chapter: Mrs. Bertha Mergenthal, Mr. Arthur Mergenthal, Mr. E. W. "Bud" Adams, Robert VanDyne and the author. The author assumes full responsibility for the facts, statistics and conclusions stated in this paper, since he supervised the field work, the keeping of the field-notes and the analysis and study of the artifacts. Collections made at the site have been placed in the William Behringer Memorial Museum, Devou Park, Covington, Kentucky, where they are displayed and available for study.

** See p. 262 for a comment on this site by James B. Griffin.

15 cm. thick. Scattered through the plow disturbed topsoil and below it in the undisturbed refuse were found fire-cracked stones, animal bone fragments, and occasional mussel shells, sherds, and worked flint. Bones and shells were usually well preserved. In the area uncovered by the test trench were found two hearths, one burial (No. 1) one "clambake" site and eighteen postmolds. The postmolds could not be identified as a house-site or other structure, though probably if a larger area had been stripped of topsoil, such an identification would have been possible.

Hearth 1 was oval, 80 by 60 cm. and consisted of a burned area on the hardpan at a depth of 40 cm. from the surface. Hearth 2 was round, 60 cm. in diameter, and like hearth 1 was merely a burned area on the hardpan, 40 cm. deep. However, hearth 2 was partially surrounded by rough slabs of stone which enclosed the western and southern sides of the burned area. No accumulation of ashes or charcoal marked either hearth, though fire-cracked stones were plentiful on and around each hearth. The clambake consisted of a pocket of clam and snail shells closely packed into an oval area 80 by 60 cm. This mass was found immediately below the topsoil at a depth of 20 cm. and was 15 cm. thick in the center, thinning out rapidly to each edge. Very little soil was found among the shells, and no sherds or bones were included in the deposit. Most of the halves of the bivalves were separated, though three pairs were found closed. The snails may have been included as part of the food, or they may have been accidental inclusions. Identification of species found is shown in the section on food remains.

Burial 1 was that of an infant approximately six months old. The bones were found in a shallow grave covered by three 10 cm. thick slabs of limestone, the tops of which were 30 cm. from the surface. The grave had been dug into the hardpan and was 60 cm. long, 40 cm. wide and 8 cm. deep, with a flat bottom. The body had been placed on its back with the head to the south and the face turned toward the right. The hands had lain on the pelvis. The bones were in good condition, except that most vertebrae and the bones of the hands and feet had disintegrated. No artifacts were found with the burial.

The test trench had been started at the center of the midden area and extended simultaneously east and west. At the start, the refuse filled soil above the hardpan was 40 cm. thick. As the trench was extended, the thickness decreased to around 25 cm. and became increasingly low in artifact content. The full-width trench was then abandoned and two lines of test holes were dug, one meter apart in prolongation of the test trench. On the east these tests reached to the edge of the highway, while on the west they approached the edge of the gully which seems to have been the limit of the village. No features were found in the western series of test holes, but a gradual thickening of the refuse was noted as the gully was approached. Here the refuse was found to be about 60 cm. thick, apparently the result of surface wash and farming activities. Fifteen meters east of the eastern end of the test trench was found a circular pit, 70 cm. in diameter. The pit was 60 cm. in depth from the present surface and was semi-circular in cross-section. The pit contained only black soil and a few small scraps of split deer bones. No sherds or other artifacts were found in or around the pit. Three and one-half meters east of the pit was found burial 2. This was the fragmentary skeleton of a male (?) subadult buried in the midden layer. No pit outlines were found, and no artifacts accompanied the burial. The upper portions of the burial had been carried away by the plow, and a few skull fragments were found on the surface above the burial. The depth from the surface to the remaining portions of the skull was 20 cm. The bones remaining indicate that the burial had been that of a dismembered individual, and that many parts of the body were missing. No trace of the pelvis or legs could be found, and, except for the left arm, the upper parts of the body were not in anatomical order. The skull lay on its right side at one side of the deposit of bones, while the lower jaw lay, upside down, 80 cm. away. Vertebrae were scattered, and bones of the right arm were in reverse position; that is, the proximal end of the humerus lay where the distal end should have been, touching the proximal ends of the radius and ulna. The right hand was entirely lacking. Under the bones at a depth of 10 cm. in apparently undisturbed hardpan was a fragment of a steatite pot. This sherd was 16 mm. thick and 75 by

50 mm. across. No other article of steatite was found either on the surface or in the excavations at the Bintz site.

Artifacts recovered from the test trench are as follows:

Ceramic

31 fragments of pot handles
1 bird-head pottery effigy
1 pottery disk bead
1 pottery disk, problematical
856 body sherds
193 rim sherds, representing 118 vessels, divided as follows:

Type	*No. of sherds*
Madisonville Cordmarked	79
Fox Farm Bowls, plain	36
" " " , cordmarked	16
" " salt pans	5
Net-marked salt pans	4
Indeterminate rims	53

Nonceramic

2 bone awls, complete
3 beamers, broken
5 bone beads
1 bear tooth pendant
2 antler arrowpoints
1 celt blade, broken
2 pitted hammerstones
5 projectile points, two stemmed, three triangular
1 flint scraper
1 mussel shell hoe
1 shell disk bead
1 cannel coal pendant, incomplete
1 steatite pot fragment

Five meters south of the center of the test trench a test was dug to determine the thickness of the refuse at this point. A concentration of sherds and bone refuse was found which led to the enlargement of the test hole into an area two by three meters. This test was designated test A, and all material found in it was treated as a unit. No pits or other features were found in the tested area. The refuse layer was a uniform thirty centimeters thick. In the refuse at one point, and badly disarranged and broken by the plow was the incomplete skeleton of an infant of about four months. No artifacts were found which might have been interred with the infant, and no grave pit was present. Apparently the infant had been buried in a shallow grave scooped out in the topsoil. Scattered through the midden in A were found the following:

Ceramic

10 handle fragments
1 pottery disk, problematical
615 body sherds, all types
75 rim sherds, representing 63 vessels divided as follows:

Type	*No. of sherds*
Madisonville Cordmarked	26
Fox Farm salt pans	15
" " Bowls, cordmarked	28
" " " , painted	5
Net-impressed salt pans	1

Nonceramic

1 beamer, broken
1 celt blade, perfect
1 flint point, stemmed
1 flint point, triangular
3 broken or crude points, flint
1 pitted hammerstone
1 "cut" turkey femur

Surface collections were made at every visit to the site. All rimsherds of pottery were saved, as were all stone implements and fragments of bone showing aboriginal working. The artifacts found comprise the following:

Ceramic

67 rims, Fox Farm Bowls
70 rims, Madisonville Cordmarked
2 rims, Fox Farm salt pans
3 rims, net-impressed salt pans
19 handle fragments
1 bird head effigy
1 grit tempered, cord-marked rimsherd

Nonceramic

5 pitted hammerstones
1 flint nodule hammerstone
15 broken or unfinished celt blades
1 broken pipe, cannel coal
1 fragment sandstone tube or pipe
7 flint scrapers
9 flint drills, whole or broken
28 flint points, stemmed, whole or broken
56 flint points, triangular, whole or broken
1 flint point, bifurcated stem
53 flint points, broken, indeterminate
15 flint blanks and rejects
2 pieces "cut" bone or antler

The Lower Village

About thirty meters north of the mouth of Twelve-Mile Creek and extending northward for about twenty meters a layer of mussel shells, animal bones, sherds, wood-ash and other midden debris was exposed in the river bank. This layer was about forty centimeters thick and was covered by an overburden of flood deposited sand two meters thick. No indication of the buried refuse appears on the surface of the cultivated flood-plain. In order to determine the extent of the buried village, test holes were dug with an extension-type earth auger. These holes revealed the refuse to extend away from the river for at least 30 meters, where it was found to be 10 cms. thick at a depth of 2 meters. Measuring from the center line of the exposed face of the refuse at the river bank, the midden was found to extend upstream about 30 meters, or to within 10 meters of the bank of Twelve-Mile Creek. Downstream, 15 meters from the center line the refuse was found at a depth of 1.8 meters and was there 7 cms. thick. The total area therefore appears to have been roughly elliptical, 50 meters long parallel to the river and about 30 meters wide, with the present river bank tangent to a part of one long side of the ellipse. No large-scale excavation was attempted in the field over-lying the refuse, since the field was planted, and it was felt that such disturbance would so loosen the soil that the next flood might severely damage the field.

Excavation was accordingly limited to the cutting of a trench along the river bank exposure and extending into the refuse layer for 3 meters. The trench was about 5 meters long, but was interrupted by the roots of two large trees which could not be removed. Initially, the material found was kept separate by squares, one meter in size, but when it was observed that the deposit was homogeneous and that no stratification could be detected or features isolated, all material was pooled and treated as a unit. Since the total area excavated was less than 15 square meters, the mass of refuse involved is not great. At the side of the tested area away from the river, the refuse layer measured 50 cms. thick, with minor irregularities on both upper and lower surfaces of the layer. No pits were encountered, though several burned areas containing wood-ash could be identified as hearths. Scattered throughout the refuse layer were found refuse bones, shells, fire-cracked stones, sherds and artifacts of bone, antler, stone and copper. Every sherd or other artifact was saved, as were most of the shells and identifiable bone fragments. Screening of the wood-ash in several instances, yielded the small bones of fish, small mammals and similar minute refuse. Artifacts found were not plentiful nor of great variety, but those found were, as a rule, in excellent condition due to the protection afforded by the flood-deposited overburden and the high ash content of the refuse layer.

The artifacts found in the tested area comprise the following:

Ceramic

3 effigy figures (1 bird, 1 snake and 1 flying squirrel?)
1 pottery disk, problematical
1 sherd, partially perforated
6 lumps potters' clay
1 awl (?), made of potsherd
1 handle (?), of pottery dipper
1081 body sherds, including two painted sherds
1 sherd showing small diamond-shaped incised design over body of vessel
344 rim sherds representing 280 vessels, as follows:

Type	*No. of sherds*
Madisonville Cordmarked	170
Fox Farm Bowls	104
Indeterminate	29
Fox Farm salt pans	23
Cordmarked salt pans	8
Net-impressed salt pans	10

Nonceramic

17 bone beads
2 perforated teeth
2 perforated deer phalanges
12 beamers, including 1 perfect
12 antler arrowpoints
9 fragments of "cut" bone
31 "cut"antler tines
5 fragments of "cut" antler strips
4 antler drifts
2 fishhooks, bone, broken
1 fishhook blank, broken
29 bone awls (2 bird joint, 7 mammal joint, and 20 splinters of bone, usually deer)
5 triangular arrowpoints, flint
3 stemmed arrowpoints, flint
1 cannel coal pendant
1 copper bead
1 celt blade, broken

Food remains representing the diet of the aboriginal inhabitants of the Bintz Site (both portions) comprised bones of mammals, birds, amphibians, and fish, mollusk shells, charred nutshells and fish scales.* The following species have been identified from the remains found.

Mammals

Elk — Cervus canadensis
Deer — Odocoileus virginianus
Bear — Euarctos americanus
Raccoon — Procyon lotor
Panther — Felis concolor
Fox — Urocyon argenteum
Skunk — Mephitis mephitis
Oppossum — Didelphis virginianus
Beaver — Castor canadensis
Groundhog — Marmota monax
Muskrat — Ondatra zibethica
Rabbit — Sylvilagus floridanus
Squirrel — Sciurus carolinensis
Rice rat — Oryzomys
Chipmunk — Tamias sciurus

Plant remains

Corn — Zea mays
Hickory nut — Carya glabra Mill

Fish

Catfish
Drumfish
Garfish

Amphibians

Land turtle — Terrapene carolina
Water turtle — Amyda spinifer

Birds

Wild Turkey — Meleagris gallopavo
Bald Eagle — Haliaetus Leucocephalus
Duck — probably Aix sponsa (?)
Crow — Corvus brachyrhincos

Mollusks

Fusconaia ebenum (Lea)
Quadrula metanevra Rafinesque
Quadrula pustulosa (Lea)
Cyclonaias tuberculata (Rafinesque)
Plethobasus varicosus (Lea)
Plethobasus crassidens (Lamarck)
Pleurobeme clava (Lamarck)
Pleurobema mytiloides (Rafinesque)
Lexingtonia dolabelloides (Lea)
Actinonaias carinata orbis Morrison
Obovaria subrotunda (Lea)
Obovaria retusa (Lamarck)
Dromas dromus (Lea)
Lampsilis ovata (Say)
Dysnomia torulosa (Rafinesque)
Dysnomia cincinnatiensis (Lea)?
Dysnomia flexuosa (Rafinesque)
Campeloma ponderosum (Say)
Oxytrema canaliculatum (Say)

* Identification of food remains was made by the appropriate divisions of the U.S. National Museum, Washington, D.C. for which our sincere appreciation is again expressed.

Artifacts from the Bintz Site

Nonceramic remains from the Bintz site are typical of those found throughout most of the eastern half of the United States. Projectile points, either whole or identifiable fragments, show that the predominate type is the simple isosceles triangle (65 per cent) with the remainder being simple stemmed or notched types. Material used was flint in one form or another. Considerable refuse cannel coal indicates that this material was plentiful and used by the Indians for many purposes. One finished pendant, shaped like a bear claw, was found, as well as one of similar shape but unfinished. One half of a double conoidal pipe of this material and one semi-circular, flat piece complete the list of objects made of this material. Numerous broken celt blades found on the surface, including some incomplete specimens, indicate that these tools were made and used on the site in considerable numbers. The lack of grooved axes is indicated by the absence of fragments thereof.

The single copper bead found is made of sheet copper folded to make a bead of roughly triangular cross-section. The bead is 16 mm. long, while the cross-section is 5 mm. wide and 7 mm. high.

The great number of bone implements found seems to coincide with the similar condition found at other Fort Ancient aspect sites, especially those at Madisonville and Fox Farm. Beamers and fragments are plentiful, as are bone awls made of deer and turkey bone joints. Beads made from hollow bird bones and from segments of antler are common. Antler arrowpoints, including specimens in various stages of manufacture are common, a total of 14 being found. Turtle shell fragments were numerous, but no indication of their use as rattles or cups was observed. Perforated deer phalanges show their use in games or as "tinklers." Bear, raccoon and elk teeth perforated for suspension were also found.

Pottery from the Bintz site falls within the pattern of the Madisonville focus as outlined by Griffin (1943). With the exception of the sherds of negative-painted ware, all of the common types at the Bintz site have been adequately described and named by Griffin. These types as determined from rim sherds at the Bintz site are: Madisonville cordmarked (46 per cent), Fox Farm Bowls (33 per cent), Fox Farm salt pans (6 per cent), net- or cord-impressed salt pans (3 per cent), Indeterminate (12 per cent). Of the Fox Farm Bowls some forty per cent are cord-impressed on exterior surfaces, five per cent are plain exteriors with negative-painted designs on interior surfaces, while the remaining fifty-five per cent is made up of plain surfaced ware. Most Fox Farm bowls show rounded bottoms, though one surface find shows a flat bottom on a plain Fox Farm Bowl. No body sherds were found which could be definitely ascribed to Madisonville Plain as described by Griffin. Twenty-five hundred and fifty-two body sherds were found, washed and examined. All proved to be either cordmarked, or were recognizable as parts of Fox Farm Bowls (plain).

Pottery handles and fragments found seem identical to those found at Madisonville and may be ascribed to Madisonville Cordmarked bowls. Lugs found on Fox Farm bowls are limited to simple horizontal rounded lugs at lip level. Effigies found seem to be from Fox Farm Bowls exclusively and consist of bird heads, a snake head, a flying mammal of some sort, and a fragmentary ornament resembling a saddle or a "setting" hen.

Five pottery disks of unknown use were found, as were similar disks of flat stone, usually limestone. The pottery disks are usually made of cordmarked ware and vary from 40 to 55 mm. in diameter.

A very few grit-tempered sherds were found in the excavations at the upper village and on the surface. These sherds are usually small and are mixed with the shell-tempered sherds in the midden. They are simple, cordmarked sherds with undifferentiated rims, which are square in cross-section. The tempering material used is usually angular pieces of limestone 2-3 mm. across.

The object listed as a pottery "Awl" is triangular in shape, about 5 cm. long, 2 cm. wide at the base with a point forming an angle of about 10 degrees. The point is polished entirely around, and the polishing extends halfway along the sides of the triangle.

The one fragment of a steatite pot and the circumstances under which found raise problems in age and source which cannot be solved at the present time. Steatite is so scarce in sites in northern Kentucky that several local collectors asked state that they have never seen such pot fragments.

Thus, the Bintz site is a small component of the Madisonville focus of the Fort Ancient aspect. The village consists of two portions: one at the river's edge at the mouth of Twelve-Mile Creek; and the other on higher ground, out of reach of ordinary floods, yet still adjacent to both the Ohio River and Twelve-Mile Creek. The cultural material removed from the site consisted of a study sample only, and the bulk of the site remains for future students. The paucity of village sites in the northern peninsula of Kentucky as compared to the profusion of such sites on the Ohio side of the Ohio River, however, renders the Bintz site an important addition to the complex of sites comprising the Madisonville focus.

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MICROBLADES AT POVERTY POINT SITES*

WILLIAM G. HAAG AND CLARENCE H. WEBB

UNTIL THE PAST FEW YEARS the Poverty Point horizon was known solely through its manifestation at the type site, Poverty Point Plantation, on Bayou Macon, West Carroll Parish, Louisiana. Webb (1944), in connection with the description of a cache of stone vessel fragments found near the large Poverty Point mound, pointed out the apparent cultural content of the site, which had previously been mentioned in archaeological literature by Moore (1913), Fowke (1928) and Ford (1936). In 1948, in a description of non-pottery cultures in the state, a further attempt was made (Webb, 1948) to clarify the Poverty Point cultural period as expressed at this site.

Artifacts and traits which were then presumed to be expressions of Poverty Point culture were: vessels of steatite or sandstone, some of which showed smoothing or polishing, lugs, incised decoration and embossed animal or eagle representations; baked clay balls ("problematical Poverty Point objects"); large projectiles of several types; large triangular, ovate and keel-backed scrapers (not "thumbnail" or "snubnosed"); celts and grooved axe; large drills of rectangular, reworked projectile and expanded base types; numerous flake drill or perforator-like objects and small gravers; two-holed gorgets; boatstones; perforated and grooved plummets of hematite, stone and baked clay; tubular pipes of clay and steatite; tubular, rectangular and barrel-shaped beads of stone, especially red jasper; bird effigy beads and miniature bannerstone bead; crinoid stem beads; hammerstones; galena balls; quartz crystals; human figurines of pottery; the trait of caching various objects; extensive and presumably prolonged occupation of a large site.

Comparisons were drawn between the Poverty Point culture and Tchefuncte of southern Louisiana, also the Lauderdale focus of the Alabama shell middens. Martin, Quimby and Collier (1947, pp. 404-6) gave recognition to a distinctive Poverty Point culture, equating it temporarily with Tchefuncte.

During the archaeological survey of the lower Mississippi Valley by Phillips, Ford and Griffin (1951, p. 273) test pits at the Jaketown Site near Belzoni, Mississippi, demonstrated fragments of Poverty Point clay objects underlying the full pottery sequence of that area. More complete testing in 1951 proved the Poverty Point cultural complex to be a prepottery horizon at this site, with only minor differences in content from that listed for the Poverty Point Plantation site.

In the fall of 1950 the senior author found evidence of an extensive flint industry which seemed to be localized along a low ridge at the Jaketown Site and associated with a series of low earth mounds. This assemblage consisted predominantly of small flake blades, perforators or drill-like objects, cores, and a few large projectile points — all similar to those occurring at Poverty Point Plantation. The blades and perforators occur by the thousands along this ridge, whereas other Poverty Point traits are rare; this lends support to a subjective feeling that the microflints may prove to be of a different age than the other aspects of the horizon. This seems especially reasonable in view of the almost complete absence of the microflints in other parts of the Jaketown site, yet plummets, scrapers, steatite vessel fragments, quartz crystals and Poverty Point clay objects occur in profusion there. In some of the road cuts and borrow-pit profiles in the main body of the Jaketown site the walls have been exposed to rains for some time; Poverty Point object fragments may be seen by the thousands, but only two or three microflints have been found in these exposures.

Only intensive excavations can cast further light upon this problem of the relative ages of Poverty Point clay objects and microflints. Of the authors, Haag is inclined to think that evidence is accumulating which will substantiate separation of these two aspects of the horizon. However, it seems equally significant that all sites discovered to date which exhibit the Poverty Point cultural assemblage yield the microflints as well as clay objects and other characteristic artifacts. Additionally, the junior author has found at Poverty Point Plantation that certain parts of the site (especially along the low ridges formed by the earth-work rem-

* Read at the 17th Annual Meeting of the Society for American Anthropology, Columbus, Ohio, May 2, 1952.

nants) yield microflints in profusion and clay balls rarely; in other areas (especially where dark soil evidences cooking refuse) clay ball fragments may be plentiful and microflints comparatively scarce; in yet other sections, microflints and clay object fragments are found together in large numbers. These differential frequencies, seen also for other artifacts at Poverty Point site, may reflect the living and occupational habits of the people instead of a difference in relative age of the artifacts. The junior author does not consider presently-available evidence adequate to predicate a difference in age between the microflints and the other cultural manifestations.

The flake industry at these sites is manifested by numerous lamellar knives, perforators or drill-like tools, gravers (at Poverty Point) and cores. Several thousands of these artifacts have been found on the surface and from the trenches at Jaketown; nearly a thousand have been collected from the surface at Poverty

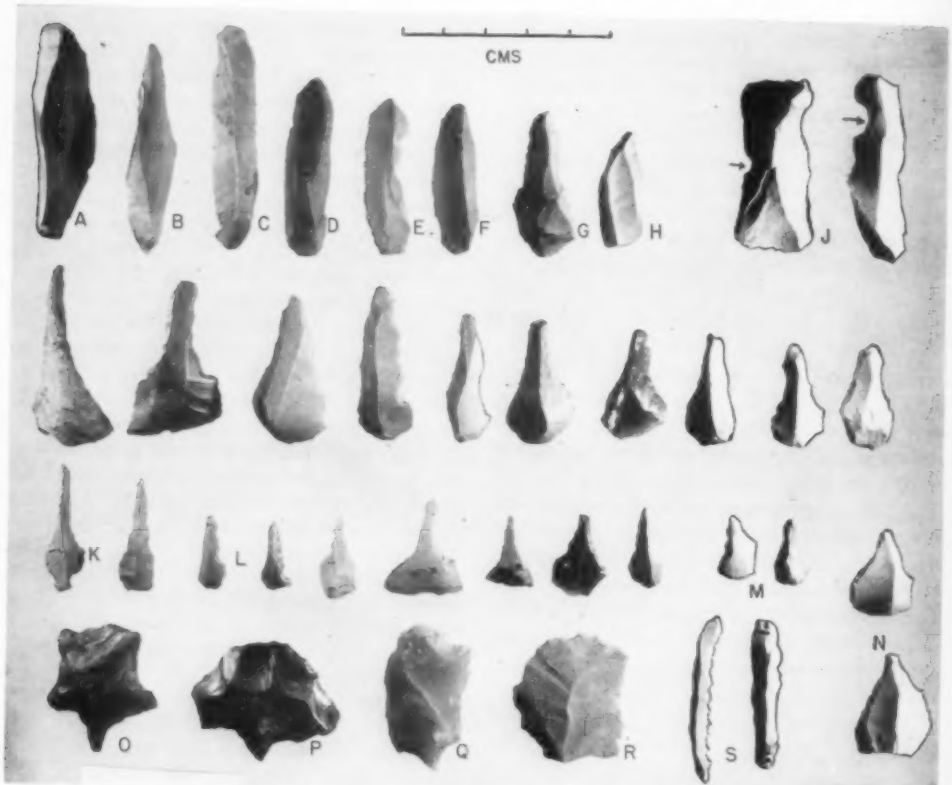

FIG. 88. Microblades at Poverty Point. *A-H*, forms of microblades showing varying amounts of retouching: *A*, on lower tip; *B*, along top half of both sides; *C*, at upper tip; *D*, none; *E*, left side; *F*, left side; *G*, both sides; *H*, none. *D*, *E*, and *H* superficially appear to be burins, but their form is accidental — they are *burins a fortune*. *J* shows two lunate scrapers, finely rechipped about the re-entry. The two middle rows are variations of the microflint that is unique in the Poverty Point horizon. These may be called perforators but the term seems a poor one. They were probably used like a burin in a backward and forward motion. *K* is very thin and delicate; *L* shows two specimens, 18 and 16 mm. in length respectively; *M* illustrates two of the very small, blunt-ended forms; *N* shows two of the larger, blunt forms. *O*, *P*, and *Q* are what are called "gravers" in most literature. The chipped spines or points of these are chipped on all sides and differ greatly from the objects in the middle rows. *R* is a typical flake scraper, chipped in nearly all edges. *S* shows two long, thin objects, chipped throughout their length on all sides. All but one specimen are unbroken. All but *O* and *Q* are chipped from one face only.

Point Plantation in a half-dozen brief visits. Most abundant are the perforators or drills, which were made by trimming ⅓ to ⅔ of the flake to a point by fine lateral chipping from one surface only. Most of the pointed ends are rather blunt in comparison with the keen perforators found with later cultures in the lower valley. Tips and edges usually show some indication of wear. These objects generally are within the range of 13 to 41 mm. in length, averaging 22 mm. The basal width varies from 7 to 25 mm., averaging 12.7 mm.

The flake knives are next in frequency. They vary from 20 to 55 mm. in length, from 8 to 23 mm. in width, and from 3 to 5 mm. in thickness. The width-length index averages 33. Some of the edges are unmodified but most are saw-toothed by minute lateral chipping which nearly always occurs on the convex face of the flake. Edges and ridges are often parallel, although most often one end is slightly wider than the other. A smaller number of triangular, ovate, and irregularly-shaped flakes are serrated or chipped along one edge.

A few gravers have been found at Poverty Point site, with the graving tip on the end of a long flake, on the side of an oval flake or on the base of a perforator, producing a double tool. The graving tips are carefully formed by chipping all around and are usually 1 to 3 mm. in length and width.

The cores or nuclei vary in size considerably; most of them show a well-defined striking platform. The most popular material was a tan chert which is often found as stream pebbles in Louisiana and Mississippi. However, a wide range of flints is represented, as is true of projectiles and scrapers at these sites.

Visits to the Poverty Point Plantation site by the authors in company with Krieger and Cotter in 1950, and with Ford and Phillips in 1951, before and during the tests at Jaketown, strengthened the previous conviction that this was a nonpottery culture, representing prolonged occupation at this site by a comparatively large population; that the flake industry was an important one; and that the large Poverty Point mound (mound A of Moore's report), as well as the nearby Motley mound, 70 and 51 feet in respective heights, were artificial and constructed during Poverty Point times before advent of pottery. During the 1951 visit an eight-foot profile about half way up the Motley mound exhibited artificial fill with soil containing fragments of Poverty Point clay objects. Charred basket impressions were found in this fill. Smaller profiles on the slope and platform of the Poverty Point mound A also showed artificial fill containing fragments of clay balls and complete absence of pottery. The more definite evidence of mound construction during Poverty Point times at Jaketown lends credence to the revolutionary idea that the tremendous mounds at Poverty Point site and the Motley site were constructed during prepottery times.

In May 1952 Ford undertook some excavations at Poverty Point. Aerial photographs secured by him demonstrate the presence of extensive earthworks which were not suspected previously. His studies, with the Jaketown excavations by him and Phillips, and Haag's study of the flake industry at Jaketown, will be reported in the near future.

Additional sites have been identified as probably or definitely related to Poverty Point. The Insley mound site located on the west bank of Bayou Macon about 20 miles south of Poverty Point Plantation, below the town of Delhi in Franklin Parish, Louisiana, contains pottery and also clay balls, large projectiles, hematite plummets, two-holed gorgets, rough celts, microflints and stone beads, all similar to Poverty Point types.

Frank Soday reported to the junior author the finding of Poverty Point artifacts at the Calion site, on the west bank of the Ouachita River, Union County, Arkansas. (It may be coincidental, but all Poverty Point period sites so far identified lie on the west bank of present or old channels.) Soday and Frank Chowning, both competent observers, have reported clay balls or fragments, hematite plummets or lumps, a rectangular drill, steatite fragments and large projectiles from this site. In 1951 the junior author and Howard, University of Arkansas, visited the Calion site. Much of it is covered by a lumberyard but a limited amount of midden material bordered the stream. A pottery occupation period is apparently preceded by a nonpottery horizon in which we found fragments of clay balls, a flake knife, a perforator, and a cache of six greenstone celts which were almost identical with rough greenstone celts found at Poverty

Point and Jaketown sites. These celts seem to be characteristic of the period; the grooved axe reported from Poverty Point Plantation is unusual.

The senior author has visited a second site in Mississippi, the Paxton site, on an old river natural levee north of Jaketown, at which site characteristic flake artifacts and other Poverty Point materials are found.

The report of the excavations at Jaketown and Poverty Point sites is awaited with interest, since it will open a new chapter in southeastern archaeology. Radical revision of ideas will be required concerning the Archaic period, the introduction of mound building, earthworks, population trends, prepottery agriculture and microlithic flint industry in the lower Mississippi Valley.

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A PROBABLE PALEO-INDIAN SITE IN VERMONT

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SINCE THE SCIENTIFIC recognition of a paleo-Indian occupation of the Southwest and high Plains, beginning with the Folsom discoveries in 1927 (Roberts, 1940), the presence of man in the eastern United States prior to the earliest demonstrated cultures of the Archaic period has been suspected on the evidence of random surface finds of fluted points. Some of these artifacts have typologically been equated with the Clovis Fluted form (Krieger, 1947, pp. 10-13), while the greater number, showing considerable stylistic variability, have provisionally been designated "Ohio Fluted points" (Shetrone, 1936, pp. 240-256; Wormington, 1949, pp. 33-35).

Not until recently, however, have fluted points been reported from associations of industrial remains markedly different from and probably older than other recognized cultures in the eastern United States. The distribution of what appears to be true habitation sites of paleo-Indian provenience now extends from Kentucky (Webb, 1951, pp. 423-424, 432-450), northward through North Carolina (Site St. 4), Virginia (McCary, 1951, pp. 9-17), and Pennsylvania (Witthoft, 1952) to Vermont. While faunal remains of any kind which might afford a clue to relative antiquity are in all instances missing, a recurring complex of tool types, embracing primarily fluted points, a variety of end and side scrapers, knives and gravers, all based on flakes, serves to relate the eastern and western groups. Moreover, both in Kentucky (Webb, 1950, pp. 309-310), and North Carolina, stratigraphic data, admittedly meager, suggest the pre-Archaic position of these manifestations in the culture succession. The St. 4 site is located at the Fall Line of the Yadkin River, North Carolina. Some elements present in this site characterize the lowest levels of a nearby, deep, stratified site producing at least nine superimposed cultural components, the oldest of which apparently post-dates the fluted point St. 4 site (Joffre Coe, personal conversation; inspection of a part of the collections).

In the light of accumulating evidence, therefore, there seem reasonable grounds for hypothesizing the presence, in a still undated period, of a thinly and widely scattered, mobile, early hunting population over much of the eastern United States prior to the appearance of the cultures classified as Archaic.

The data presented here came from the Reagen site in northwestern Vermont, the first recognized probable early man site in New England. Since its discovery some 20 or 30 years ago, collecting has been done at this locus by William A. Ross and Benjamin W. Fisher of St. Albans, Vermont, who have generously lent their collections to the writer and given their consent to the preparation of this report. In October, 1950, thanks to the aid of a grant from the Wenner-Gren Foundation for Anthropological Research, and through the courtesy of the owner Reagen, and Ross, who conducted the party, the writer, assisted by Donald Lenig, made a brief examination of the site and was at once impressed by its peculiar characteristics and unique situation.

The Reagen site is located between the villages of Shawville and East Highgate, in southeastern Highgate Township, Franklin County, Vermont. It lies approximately 8 miles southeast of Missisquoi Bay on upper Lake Champlain and only 6 miles south of the Quebec border. From an elevation of some 300 feet above the Missisquoi River, here 200 feet above sea level, one looks from the site south and west across the broad valley, glimpsing the river in both directions. At its nearest point it flows about three-quarters of a mile to the west, where it is crossed by the road at East Highgate. Northeast of the observer the land continues to rise more steeply, forming a series of long, narrow, parallel, partly wooded, rock ridges, trending off in this same direction for many miles. The site thus occupies a portion of the high, broad, irregular flank of a hill which, within about half a mile, rises to a maximum elevation of 700 feet (or 200 feet above the general level of the site and 500 feet above the river). Directly eastward, across a steep, brook-bearing ravine, lies a parallel ridge of about the same elevation, called Rice Hill.

Geologically, these highlands consist of partly exposed and greatly weathered Gilman quartzite of lower Cambrian age, belonging to the Oak Hill succession which "occupies the whole region between the eastern margin of the

Champlain Lowland and the western foot of the Green Mountains" (Booth, 1950, pp. 1131-1136, 1148-1149).* Thinly mantling the rock at, and in the vicinity of the site, is a loose yellowish sand, probably deposited by the marine invasion of the Champlain Valley during late Pleistocene times (Chapman, 1937, pp. 113-116).

The site was discovered when dune action, still progressing, began some years ago, following the cutting of a protective stand of large white pine. Most regrettably, the original relationship of the artifacts to the sand deposit is unknown. The collections made by Fisher and Ross and the few specimens found by Lenig and the writer, came from the surface over an area of approximately two acres of shifting sand, or from the wind-exposed rock which everywhere underlies it or stands out in rounded weathered eminences here and there among the dunes. A volunteer growth of young pines may in time succeed in reestablishing a stable land surface, but at present new sections are constantly being exposed by the live dunes and old ones covered up.

Random test pits made by our party, both within and on the periphery of the area showing occupational traces, revealed no humus or habitation zone of any kind, nor were any artifactual remains disclosed.

The changing surface, systematically combed for artifacts, now produces a meager yield, but numerous stone flakes and chips, mainly of chert, still litter the sand. This rejectage of local manufacture serves to delimit the locus of habitation and, taken together with the 179 artifacts studied, appears to indicate a camp site of fairly extensive size. We may suppose that it was intermittently frequented by a group or groups of early hunters, having a quite consistent industry restricted to a small inventory of chipped stone tools and weapons and unique rubbed stone ornaments. No trace of bone or antler survives, nor have any structural features been noted. However, a thin scattering of fire-broken stones and occasional bits of charcoal may pertain to ancient hearths.

Efforts on the part of Ross and Fisher to locate the source or sources of the stone materials in the vicinity of the site have produced negative results. The 179 artifacts comprising the collection are fashioned from the following rocks and minerals, listed in descending order of frequency: a banded black and grayish brown chert of good quality, 58 specimens (32.4 per cent); whitish, yellowish or reddish rhyolite, including some specimens which mineralogically appear to be felsite (37 or 20.6 per cent); a clear, dark gray, semi-translucent chert exhibiting vermicular imperfections (29 or 16.2 per cent); gray and greenish talc (13 or 7.3 per cent); black chert, apparently different in texture from the first mentioned material (12 or 6.7 per cent); blue-gray or mottled gray and brown chert closely resembling the Onondaga in New York (10 or 5.6 per cent); trap rock or basalt (7 or 3.9 per cent); gray and white quartzite (5 or 2.8 per cent); brownish gray or brown chert, unlike the Onondaga (3 or 1.7 per cent); yellow jasper (2 or 1.1 per cent); and one specimen each (.6 per cent) of mottled gray and white chert, green chert and gray chalcedony.

An analysis of the chips and flakes in the collection, including those gathered in October, 1950, shows 33 composed of the prevailing banded black and grayish brown chert, 20 of clear gray chert, 13 of rhyolite, 3 of gray trap rock, 2 each of gray quartzite and mottled gray and white chert, and one each of black chert and dark red jasper (the latter is apparently a fragmentary artifact). In addition, Ross says that he has found on this site two or three chips of a striking banded orange and black chert.

Several points of interest attach to this rather wide assortment of materials. First, it seems to have been carefully selected for quality and amenability to flaking. Also it evidently represents a wide range of sources, many of them probably distant from Vermont since, for the most part, they were unfamiliar to the geologists questioned by the writer. Moreover, a very marked degree of weathering is seen on the rhyolite, trap, and certain of the chert specimens, while other flint and talc objects exhibit a vitreous patination. This fact of weathering is especially evident by comparison of the rhyolite and trap rock with similar materials found in 1951 on a pottery-producing Woodland site in the upper Connecticut

* Dr. Charles G. Doll, State Geologist of Vermont, has kindly indicated the geological references for this and the following portion of the paper dealing with the chert sources. I am also indebted to various members of the geological and paleontological staffs of the N.Y. State Museum for assistance with these problems.

Valley, New Hampshire, by Mr. and Mrs. Howard R. Sargent, under the auspices of Phillips Academy, Andover. Sargent discovered a source of rhyolite near Berlin, New Hampshire, about 100 air line miles east of the Reagen site.

Specimens of the stone materials were submitted to Charles G. Doll, Alan Shaw and Wallace M. Cady, the latter two familiar through field work with the detailed geology of the region. According to Doll (personal communication), "the trap rock specimen compares well with the rock composing trap dikes in the Champlain Valley. Rare occurrences of trap dikes have been found in the Green Mountains [of Vermont]. The talc belt extends almost the length of the Green Mountains and the material of specimens No. 6 [the pendant ornaments] could readily have been obtained from a deposit there. Deposits have been reported by residents in the Hazen Notch area and to the north. The rhyolite material I am unable to place, although small dikes at Cuttingsville show some resemblance."

Doll also states that the quartzite composing four of the specimens could have been derived from the Cheshire quartzite formation of south-central Vermont, a southern extension, with modification, of the Gilman quartzite underlying the site (Cady, 1945, pp. 526-528). He calls attention to the reported finding of occasional flint constituents in the Rugg Brook formation of northwestern Vermont (not mentioned by Booth, 1950, pp. 1151-1153) and in the Cutting and Clarendon Springs formations farther south (Cady, 1945, pp. 541-542, 536-537). These references, however, only mention, without description, the occurrence of black cherts.

Thus while the bedrock sources of the black and banded black and grayish brown cherts remain obscure, Shaw (personal communication) recognized the clear gray chert "as a type of chert that is common in Lower and Upper Cambrian rocks directly along the International Boundary between 73° 1' 30" W. and 73° 2' 45" W. It occurs as secondary stringers in all rocks except slate for about a quarter of a mile south of the Boundary; I do not know how far north it goes."

The presence of what may be Onondaga chert points to loci farther south where the Onondaga escarpment crosses New York State. Only one point seems reasonably well established by the inquiry, viz., that a number of exotic materials are present and that the determination of their sources would furnish a very helpful lead concerning the movements of this group of people.

The chipped stone industry of the Reagen site embodies a complex of piercing, cutting, scraping and graving tools and weapons, more or less arbitrarily divisible into four major categories and typologically into 14 traits. A fifth category comprises the ornaments of rubbed talc. All except the last have parallels in sites attributable to the paleo-Indian in various parts of the United States.

Simple end scrapers (Fig. 89, *44-50, 55-60*). These number 30 and constitute 16.6 per cent of the total collection. The materials are rhyolite (12), banded chert (6), gray chert (5), quartzite (3), Onondaga (?) chert (3), and black chert (1). The length range is 26-72 mm., the majority falling between 34-41 mm.; the range in thickness is from 3-14 mm., with most being between 5-8 mm. Eleven are rectanguloid in shape, 9 are trianguloid, 7 (with broken bases) are irregular, and 3 are elongate. All have been made from thick flakes, prevailingly broad (in three instances they resemble lamellar flakes (Fig. 89, *47*), chipped only on the upper surface (one exception has the under surface broadly flaked). The lower surface is mainly concave, but may be nearly flat. Ripple marks are sometimes present and the bulb of percussion is generally evident at the smaller end. The broad scraping edge is steeply beveled by retouching which may be coarse (17) or medium (13) in execution. In 7 examples the chipping is confined only to the curved front edge (Fig. 89, 46); in a majority it extends part way along one or both sides, and very rarely around the base. In 11 cases it is of such character as to suggest a combination end and side scraper (Fig. 89, *44, 45, 47, 49, 56, 58, 59, 60*, see arrows). This is further indicated by the fact that in 3 of 6 specimens the worn edge extends along one side to near the base (Fig. 89, 59, 60).

Stemmed end scrapers (Fig. 89, *41-43, 51-54, 61-63*). These differ from simple end scrapers only in exhibiting a more or less well-defined, constricted stem, which is chipped along both sides to, or including, the base (Fig. 89, *62, 63*). In the series of 17 (9.5 per cent of total collection), 10 are of banded chert, 4 of rhyolite, 2 of Onondaga (?) chert, and one of gray chert. The length range is 27-60 mm., the thickness 4-14 mm.

Side scrapers (Fig. 89, *64-76*). Nearly the same frequency (31 or 17.3 per cent) prevails in side as in simple end scrapers. Eleven are of banded chert, 8 of rhyolite, 3 of gray chert, 2 each of black chert and trap rock, and 1 each of yellow jasper and brownish gray chert. The length range is 22-91 mm. (majority 40-52), thickness 3.5-15 mm. (majority about 6 mm.). Thick spalls or flakes, struck from blocks or, in some cases,

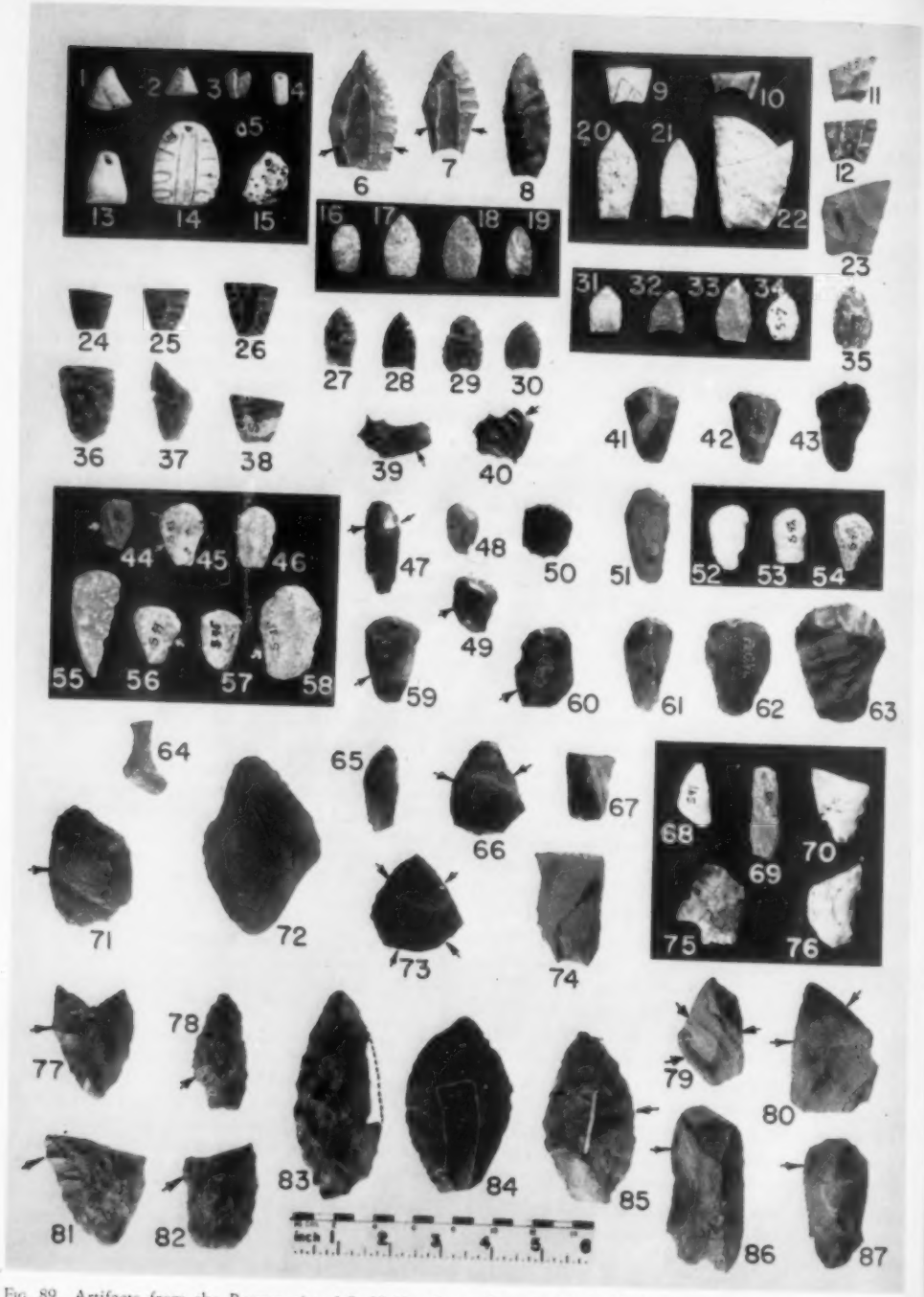

FIG. 89. Artifacts from the Reagen site. *1-5, 13-15,* talc pendants; *6-12, 20-23,* lanceolate pentagonoid points; *16-19, 27-30,* trianguloid points; *24-26, 36-38,* basal sections, probably of lanceolate points; *31,* pentagonal point; *32,* eared triangular point; *33-35,* stemmed points; *39, 40,* combined gravers and spoke-shave scrapers; *41-43, 51-54, 61-63,* stemmed end scrapers; *44-50, 55-60,* simple end scrapers; *64-76,* side scrapers; *77, 78, 81, 82,* knives with single shoulder; *83,* lanceolate knife; *84,* ovate knife; *79, 80, 85-87,* knives from retouched flakes.

probably from prepared cores, were used. Six are based on lamellar flakes (Fig. 89, *65, 69*). One is a true double spoke-shave scraper (*64*). As in the end scrapers, one surface is unworked and usually shows the bulb of percussion. From one to three edges have been steeply retouched, sometimes from opposite sides of the flake (Fig. 89, *66, 73*, see arrows).

Combined gravers and spoke-shave scrapers (Fig. 89, *39, 40*). There are only 4 artifacts in the complex (2.2 per cent) which seem describable as combination graving and shaft-scraping tools. Banded black, gray, and mottled blue and gray Onondaga (?) chert are the materials used. All are chipped on one face only. One example, steeply retouched along upper and lower edges, exhibits a short sharp point which may have served as a graver, although the fact that the adjacent edge is an unworked fracture plane renders this identification uncertain. A better example, *40*, has a small, delicately chipped point on either side, the upper one bordered by a steep, concave chipped edge. The adjacent, straight edge (indicated by arrow) is finely chipped to form a narrow cutting edge, thus this tool seems to have had a three-fold purpose. Figure 89, 39 has no fewer than 5 delicately chipped graving points and 5 adjacent curved chipped edges. Like *40* it also has an adjacent chipped, straight, knife-like edge (see arrow). These have close parallels in the Lindenmeier series (Roberts, 1935, p. 27).

Knives, retouched flake type (Fig 89, *79, 80, 85-87*). This is the commonest knife form on the Reagen site, comprising 18 or 10.1 per cent of the total complex. The material of all is banded chert. Length of intact pieces varies from 35 to 84 mm. (majority 38-62 mm.), thickness from 4-12 mm. (4-8 mm. for most). There is close resemblance in character between this class of knives and the side scrapers described above. Broad flakes or spalls were employed, usually showing rude, wide, random flake scars on the upper surface, and a smooth or ripple marked, concave (rarely convex), under surface carrying a bold percussive cone, usually at the narrower end. Marginal retouching, coarse to medium or medium fine, occurs along one (11 examples), two (4), or three (3) edges (marked by arrows in Fig. 89, *80, 85-87*). Where two or more edges are worked, the chipping was often done from opposite faces of the flake. The difference between these implements and what has been described as side scrapers lies in the steeper bevel of the retouched edge of the latter. The utilized edge in the knives is thin, the chipping angle being slight. In a few cases, however, this feature is intermediate in degree and it would seem that the edge might have been adapted for either cutting or scraping.

One aberrant specimen, included in the trait list under description, is illustrated as *85*. It suggests a core tool, but is nearly smooth and unworked on one face and roughly chipped all over on the other. The maximum thickness (along the axis marked in white) is exceptional, being 26 mm.; one edge (to left in photograph) is partially worked down to form a thick grip, the other edge (see arrow) being thinned to a sharp cutting line by the union of the chipped upper face and smooth under fracture plane.

Knives with single shoulder (Fig. 89, *77, 78, 81, 82*). Unfortunately, only one of the 6 examples (3.3 per cent of total inventory) is complete. Four are basal, one a point section. Material in 3 is banded chert, of 2 others gray chert, of the sixth (*78*) probably basalt with weathering out ferruginous masses. All are lenticular in cross section, coarsely flaked on both faces, and have weak marginal retouching in 2 cases (*77*). The diagnostic feature is a weak shoulder point along one edge (see arrows). There seem to be 2 types of base, one constricted to a blunt point (*77, 81*), the other with parallel sides and straight base (*78, 82*). These implements are reminiscent of the 2 types of Sandia points, *77, 81* suggesting type 1, and *78, 82* type 2 of Wormington (1949, p. 72).

Knives of lanceolate type (Fig. 89, *83*). Pictured is the most complete of the 4 examples (2.2 per cent of total collection). It has been restored from 3 fragments and a segment of one edge is still missing. The maximum thickness is 10 mm. The base of another (5 mm. thick) is rounded, a second base (6 mm. thick) is straight; while the fourth specimen (thickness 8 mm.) is a tip portion. All are lenticular in section, are of banded chert, show bold flaking scars over both surfaces, and have no marginal retouching along the sinuous cutting edges.

Knife of ovate type (Fig. 89, *84*). This unique artifact of black chert is made from a broad thick spall and has a lenticular cross section. The narrow truncated base preserves a remnant of the bulb of percussion. The convex cutting edges are slightly sinuous from alternate flaking scars, which reach more than half way across the blade on both sides, and they have been somewhat improved by secondary finer marginal chipping. One side is further thinned and slightly hollowed by a broad channel, terminating in a hinge scar. The flake producing it was struck from the base and extends approximately two-thirds of the distance to the point. The groove is 14-20 mm. broad and 1.5-2 mm. deep (outlined in white on illustration).

Point of eared triangular type (Fig. 89, *32*). Only one of this type occurs (.5 per cent of total collection). Made of rhyolite, it is 5 mm. thick at the tip, but the base has been thinned to 2 mm. by a short, broad channel flake (6x8 mm.), ending in a hinge scar, on one face. The edges are characteristically convex, the base concave as usual, and the "ear" is more lateral and pronounced on one side.

Points of trianguloid type (Fig. 89, *16-19, 27-30*). There are 10 of these, constituting 5.6 per cent of all artifacts. Four are of rhyolite, 2 of trap rock, 2 of gray and one of black chert. The length range is 25-33 mm., the thickness variation from 2.5-5 mm. Typical is a constricted, concave or straight (2 cases) base and excurvate edges. All are based on a broad, thin flake, un-

modified in 6 instances on one side except for small marginal trimming at certain points to reduce a thick edge. Two exceptions (*17, 29*) have both faces irregularly chipped, in conformance with the rude technique of reduction seen on the worked surface of the first mentioned 6 points. Two others (*27, 28*) are thin (maximum 3.5 and 4 mm.) and very well chipped on both sides. *28* has a rather well pronounced "ear" on one corner and there is a question as to whether it should not have been included with the eared triangular type.

Points, probably of lanceolate type (Fig. 89, *24-26, 36-38*). Known only from basal sections are 12 artifacts (6.7 per cent of all) fashioned from rhyolite (1) and a variety of cherts (gray, 3; black, 3; gray Onondaga (?), 3; mottled white and gray, and grayish brown, 1 each). The bases are constricted, straight or lobate, the edges were probably excurvate. Six (*24-26, 36-38*) are exceedingly well made by the oblique parallel flaking technique, and one of these (*26*) has in addition a channel flake scar running up one face. The side and basal edges of all but 4 are rubbed smooth and only in these 4 cases does the maximum thickness exceed 4 mm., being 5-8 mm., due perhaps to the poorer gray chert and rhyolite materials (*36, 37*).

Points of lanceolate pentagonoid form (Fig. 89, *6-12, 20-23*). Nineteen specimens, or 10.6 per cent of the total, comprise this group, of which 4 are intact (*7, 8, 20, 21*), one lacks only the base (*6*) and 14 are concave basal portions (*9-12, 23*) which seem in stylistic agreement with this classification but differ from the other point types in the industry. Gray chert is the material of 6, rhyolite of 4, black chert of 2, while each of the 7 others is made of a different stone, viz., banded black, brown, greenish-gray, and mottled gray and brown Onondaga (?) cherts, gray chalcedony, quartzite and trap rock.

In the points illustrated as *6* and *7*, the lower edges, below the faint "shoulder points," are rounded and polished, slightly in the second, markedly in the first (see arrows). This feature appears also on several of the basal fragments.

Of major interest is the occurrence of vertical channeling along one face in 2 basal sections (*12*) and on both surfaces of 4 others (*6, 7, 9, 10*). In the larger base fragment (*12*) it is very shallow (less than 1 mm.), 8 mm. in breadth, and runs the full length of the section. In the second base, of gray chalcedony, the fluting, shallow and 5 mm. wide, originates at a medial basal protuberance, as in many Folsom points (Roberts, 1935, p. 19), and also originally was longer. Another (*9*), of rhyolite, has weak channel flake scars on both sides; while in a finely chipped quartzite base (*10*) the grooving is wide (c. 14 mm.) and about 1 mm. deep on either face.

Figure 89, *7* has grooving about 1 mm. deep and 10 mm. wide nearly to the tip of the surface illustrated, where it terminates in a hinge fracture scar. A number of transverse ripple marks are evident throughout its length. The opposite side bears 2 parallel channel flakes, struck out side by side, for a total width of 14 mm. at base and 19 mm. at termination point, 26 mm. distant. A third short (10 mm.), narrow (c. 3 mm.) fluting runs midway upward from the base, effacing the low medial ridge formed by the union of 2 edges of the principal channel scars.

In the portrayed aspect of number 6 the grooving is broad (12-15 mm.), shallow (c. 1 mm.) and long (45 mm.). On the opposite face it is narrower (10 mm.) shallower and shorter (28 mm.).

Figure 89, *8, 20* and *21* are unfluted. The latter, in particular, shows horizontal parallel flaking, the scars traversing the full width of the surface. *8*, the single uniface point, is made from a thin flake broadly chipped on one face, marginally retouched on both. The plane face is thinned at the base by vertical flaking to remove the cone of percussion. All others are biface artifacts, lenticular in section.

Point of pentagonal form (Fig. 89, *31*). This unique point, made from a dark trap rock, deeply weathered to a grayish to reddish brown, is 4 mm. thick, chipped on both sides and lenticular in section. Such chipping scars as have escaped erosion are broad, shallow and irregular.

Points of stemmed type (Fig. 89, *33-35*). These number 4 (2.7 per cent of total series) and are of gray chert (2), rhyolite and quartzite. All have incipient sloping shoulders. *35* lacks the extreme base; in all others this feature is straight. *34, 35* are based on flakes, chipped on one side only, with but slight retouching of the edges on the plane surface. In maximum thickness they are 3 and 3.5 mm., respectively; in cross-section plano-convex. *33*, and the unillustrated fragment, are chipped on both sides, lenticular in section, and have respective thicknesses of 6 and 11 mm.

Chipped artifacts of indeterminate form. Only 8 artifacts, 4.4 per cent of the entire collection, are too fragmentary to admit of classification in the described categories. These specimens consist of 3 projectile points, minus base, of gray chert, yellow jasper and felsite, respectively, well chipped on both sides; what seems to be a point fragment of elongate form, minus tip, having excurvate edges and an oblique base, the material of which is profoundly weathered rhyolite; and 4 basal sections of what may be knives of lanceolate type, broken and discarded in process of manufacture from banded (1), gray (2) or black (1) cherts.

Pendants (Fig. 89, *1-5, 13-15*). This is a varied and evidently unique category of personal ornamental objects peculiar to this site since, to the writer's knowledge, nothing comparable has been reported elsewhere. It comprises nearly as many forms as there are specimens, 13 in all (7.2 per cent of total inventory). The material is gray and greenish gray talc. The perforations were not made by drilling but by gouging or cutting from opposite sides (as in Dorset Eskimo specimens). All are shiny and worn looking, probably from sand polish.

Figure 89, *14*, the largest, of light green talc, has a flattened base, rounded edges, flattened elliptical cross section, and is 7 mm. in maximum thickness. A definitely worn suspension cord groove appears at the top of the perforation. A broad (c. 8 mm.), shallow, medial channel has been rubbed longitudinally the full length of both sides. Along either margin of these channels are ranged vertically, at right angles, 4 short parallel grooves. This extraordinary decorative trait suggests a transfer for ornamental use, and by the technique of abrasion, of the flaked channel device seen in certain of the points and knives. In addition, numerous irregular, and probably adventitious, scratches occur on one surface. There is a fragment of a second pendant of this type in the collection. *13*, of brownish gray talc, with truncated base, rounded edges and oval cross section, is 6.5 mm. thick at the top and 11 mm. at the bottom. Old random surface scratches may be seen under the shiny patina. The pendant of light green talc, sigmoidally curved in section, shown in *15*, has rounded edges which are notched throughout with deep or shallow grooves. The maximum thickness is 8 mm. A thin (3 mm.), discoidal-shaped pendant of dark gray talc, with broken perforation, is illustrated in 3. Like *14*, it bears on both faces a full-length, vertical groove. *2*, triangular in outline and plano-convex in section, is of light gray talc, 5.5 mm. in thickness, and has the perforation partly broken away, as in 3. A small, rectanguloid, flattened, and thin (3 mm.) pendant of light greenish gray talc, is pictured as *4*. It, too, has rounded edges. An incipient perforation has been started near one end by gouging from both sides, apparently with a narrow, pointed tool, probably a chert flake. The tiny ornament, 5, more closely resembles a bead than a pendant. It may best be described as a flattened triangle of greenish gray talc, only 7.5 mm. long and 3 mm. thick. *1* illustrates what seems to be an unfinished pendant of light greenish gray talc, 23 mm. both in length and breadth and 10 mm. in thickness. In form it resembles *2*. Both faces carry an irregular series of broad, shallow cuts, each displaying fine striations, apparently produced by whittling with a flint flake knife. The base seems to have been finished, by the technique of grinding, to a rounded form. It bears on one side 2 parallel horizontal notches. There is no sign of a perforation.

Another artifact, recently broken, is of dark gray talc, with an elongate form like *4*. The remaining portion is 18 mm. long, 7 mm. broad and 3 mm. thick. It is said to have been perforated when found. The additional 3 specimens are too fragmentary to permit formal classification or adequate description.

The literature on early man sites in the United States is now very extensive (for published sources up to 1939 see Sellards, 1940. Cf. Wormington, 1949, pp. 173-184), precluding, both in scope and nature, full comparison with the Reagen site. As might theoretically be anticipated, closest agreement is to be found in the eastern group of stations.

The Reagen component is unequivocally linked to that large constituent of early man sites characterized by a fluted point tradition, comprising an emphasis on flake rather than core tools and primarily upon uniface as opposed to biface specialization. As such it appears to represent another variation, in a new locality, on a basic theme which, in over-all perspective, suggests with accumulating evidence, widely disseminated parallel developments having spatial and temporal significance.

In the categories of scraping and cutting tools, based upon modified stone flakes, the Reagen site exhibits the closest general similarities with fluted point sites throughout the country. Insofar as can be determined from descriptions and illustrations, the likenesses outweigh the differences, both as respects typology and technology, in end and side scrapers, flake knives, gravers and combinations thereof (Howard, 1935; Roberts, 1935, 1936, 1939, 1940; Cotter, 1937; Webb, 1951; McCary, 1951; Witthoft, 1952). In still other traits one can point to broader resemblances, some of a more detailed and specific order, involving single or combined items. In point of time, the earliest of these, as previously mentioned, relates to the Reagen knives (or points?) with weak shoulder and lobate or truncated style base (Fig. 89, *77*, *78*, *81*, *82*) which suggest Sandia forms.

These forms may have a wider distribution in the eastern United States than is generally supposed. Recently the writer has seen, through the courtesy of Arthur G. Smith of Norwalk, Ohio, 4 smaller and thicker specimens, one with constricted and rounded, 3 with rectangular and flattened bases, found on surface sites in northern and central Ohio. They range in length from 57 to 70 mm., in maximum breadth from 21 to 26 mm., and in maximum thickness from 8 to 12 mm. Their closest parallels, both with respect to size and shape, reside with the Reagen example, shown as Figure 78. Greenman (personal communication) has reported the discovery of 2 very similar points from the intermediate site (CH-1) at Killarney, Ontario. Both are basal fragments of type 1 points and came from the lower component of the site "which is in beach gravel at 56 feet above present Lake Huron level, at a depth of from 1½ to 2½ feet,

and out of any archaeological context. A Folsom-like graver was probably also from this beach gravel, but it was picked up on the surface of the road that runs over the site."

Certain of the point types, on the other hand, have their closest parallels in assemblages presumably later than the fluted point industries. The lanceolate pentagonoid type (Fig. 89, *6-12, 20-23*), for example, has elements of accord in chipping technique and general outline (even to the presence in some cases of a faint "shoulder point") with the lanceolate point of the Starved Rock Archaic (Mayer-Oakes, 1951, pp. 316-317. Compare Fig. 89, *5, 6, 9* with Mayer-Oakes, 1951, Fig. 101, *4, 5, 14, 30, 31*) which, however, is never fluted, a feature found on nearly one-third of the Reagen specimens of this form. This fact might indicate the derivation of the Starved Rock lanceolate from a fluted type as seen at Reagen, the parental form of the latter being, perhaps, the more common Clovis-like point of the eastern United States.

With the Starved Rock Archaic the Reagen complex also shares end scrapers, side scrapers, flake knives and stemmed points (the latter different in several particulars). A later dating for the former is indicated by the inclusion of side-notched points, drills, so-called choppers, ground stone and copper artifacts, and galena cuboids.

The fragmentary points described as probably of lanceolate form in the Reagen series (Fig. 89, *24, 26,* 36-38) are vaguely reminiscent of the long lanceolate points with rounded or somewhat flattened bases (Shippee, 1948, Pl. 2, *A, d, f; B, d; C, c, d*) found in the Nebo Hill lithic complex, a probable Archaic culture of western Missouri. However, the Reagen points were evidently smaller, are definitely thinner, lenticular in section, were produced by fine parallel flaking, and one is even fluted on a single side. The variant form, illustrated as *C, h* and *i* of Shippee's plate, seems more closely akin to Reagen *20* and *21*, pertaining to the lanceolate pentagonoid group. Mayer-Oakes has also compared them with his Starved Rock lanceolate type (Mayer-Oakes, 1951, pp. 318, 320) and Shippee (1948, p. 30) calls attention to similarities with Plainview points (Krieger, in Sellards, Evans and Meade, 1947, pp. 938-952) and the leaf-shaped type with concave base from Signal Butte I (Strong, 1935, p. 233).

These random comparisons, torn from context, afford little insight, in the present state of knowledge, to possible western relationships for the Reagen complex, but the scent grows infinitely stronger as we return to the eastern United States to scrutinize, in particular, the Williamson site in southeastern Virginia and the Shoop site in southeastern Pennsylvania, both extensive surface stations on high ground.

The former has produced 33 fluted points of 2 forms, 172 end scrapers, 26 side scrapers, 18 fluted basal ends of knives (perhaps points broken in process), 6 small leaf-shaped knives and "many broad blades of different shapes and sizes which were made from large flakes and cores" (McCary, 1951, p. 13). Some of these latter resemble *84* from the Reagen site, save that the Vermont specimen carries a channel flake scar on one side; others may be likened to *83*, a Reagen lanceolate knife.

One form of the fluted point has straight sides expanding towards the tip; the second is concave above the base and convex beyond this constriction (McCary, Fig. 8, *10, 15, 17, et al.*). The latter bears the closer resemblance to the Reagen specimens (*6, 7*) whose pentagonoid outline is even more strongly approximated by McCary's fluted pentagonal (Fig. 8, *19*). Two other unfluted pentagonal points (McCary, Fig. 8, *20, 21*) are like, but larger than, the Reagen pentagonal (*31*).

On both stations the industry is confined to artifacts of chipped stone, many of them made on the spot, as attested by the abundance of flint debris.

On the basis of a detailed analysis, Witthoft (1952) finds a virtual identity of the Williamson and Shoop series. Accordingly he ascribes both to his Enterline Chert Industry, which he regards as the earliest established manifestation of man in the eastern United States.

Although he had not seen the Reagen material and had only notes supplied by the writer on which to form an opinion, Witthoft postulated a somewhat later date in the paleo-Indian period for the Reagen complex (Witthoft, 1952; personal communication). With this judgment I incline to concur, chiefly on the evidence of a more diversified point inventory embracing a number of non-fluted forms.

The Reagen assemblage also includes the puzzling category of talc ornaments suggestive of a more advanced order of culture than that represented by the Enterline Chert Industry.

This assumption may be misleading, however, considering the presence of engraved bone and stone disks in the Lindenmeier site of the Folsom complex (Roberts, 1936, pp. 25-26, 31; 1939, Plate 10).

Pending the almost certain discovery of other stations of this character in the Northeast, it will be wise to refrain from wide speculation. At present the Reagen site represents a unique record of early hunters doubtless prior to the dominant Archaic culture of the Northeast, the Laurentian phase, for which a single radiocarbon date of 4,930±260 years B.P. has been established in central New York (Arnold and Libby, 1950, p. 7; Ritchie, 1951, p. 130). Hints of continuity with the Laurentian are lacking, except for the eared triangular point (compare Fig. 89, *32* — and perhaps *28* — with Plate XV, Figs. 1-13, *21-26*, in Ritchie, 1940), certain undeniable correspondences between the lanceolate points shown in Figure 89, *24-26, 36-38*, and parallel flaked forms from the older levels of the major Laurentian stations at Brewerton (Ritchie, 1940, Plate XV, Fig. 66 and p. 35; Plate XXV, Figs. 13-16 and p. 71), and less specific similarities in uniface flake tools, viz., end scrapers, side scrapers and knives (Ritchie, 1940, Plate XV, Figs. 52-55, 59, 62, 63, 71, 72; Plate XXV, Figs. 1-6, 24, 34, 35).

That the Reagen complex has roots in the Enterline Chert Industry seems almost certain, but it is a less "pure" expression, apparently also containing combined derived elements from industries other than the fluted point facies. Thus, in the temporal sequence of the Northeast, it may be found to occupy a position in the late paleo-Indian horizon, or sometime prior to 4000 B.C.

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KARL SCHMITT — 1915-1952

On August 6, 1952, Karl Schmitt was killed when his car was struck by a train at Magdalena, New Mexico, while he and his family were on their customary vacation in the Southwest. His death is a great loss, not only to his colleagues and friends, but to the field of anthropology.

Born in Albany, New York on December 20, 1915, Karl spent the greater part of his youth in Washington, D.C., where he graduated from William McKinley High School and from George Washington University, receiving his B.S. degree in 1938 in the field of geology.

Participation in archaeological work of the United States National Museum in western Missouri influenced him to enter the University of Chicago in the fall of 1938 to study anthropology. A second season with the United States National Museum excavation party was spent in eastern Kansas. In 1939, he worked at the Kincaid site in southern Illinois and in 1940 he shifted his attention to the eastern seaboard. During this latter period, he conducted work for the Broome County Historical Society at Castle Creek in New York, and at Potomac Creek, Virginia for the United States National Museum. In March, 1941, Karl began a year of service as archaeologist for the National Park Service at Ocmulgee National Monument, Macon, Georgia, and further widened his experience.

In August, 1941, he married Iva Osanai, a student of anthropology at the University, and in the spring of 1942 he returned to Chicago to complete and receive his M.A. degree in anthropology. However, he soon entered the army as an Aviation Cadet, whereupon he was returned to the University of Chicago for training as a weather observer and later was commissioned as an Air Corp Weather Officer. The following three years were spent in setting up or operating weather stations both in the United States and the Southwest Pacific.

Mustered out a Major, Karl returned to do graduate work at the University of Chicago where he was awarded a Teaching Assistantship. The doctorate was conferred in late 1947. His Ph.D. dissertation incorporated much of his earlier work on the Atlantic coast into a broader study entitled "Archaeological Chronology of the Middle Atlantic States."

In September, 1947, Karl accepted a position as Assistant Professor of Anthropology at the University of Oklahoma primarily because of the state's opportunities for field work and his growing interest in the Plains area. During his five years at the University of Oklahoma, Karl devoted his energies to teaching, advising students, doing fieldwork among the Indians, working in the labs or writing reports. Social activities he eschewed as too demanding upon his time.

Karl's chief contributions, aside from his influence upon students, lie in the fields of archaeology and ethnology. His reports on the Middle Atlantic States chronology and sites in the Washita River valley of Oklahoma are important. Karl was deeply interested in historic or proto-historic archaeology and felt the need for broader ethnological interpretations of archaeological materials.

(Continued next page)

The Indians of Oklahoma offered a great attraction for Karl. Maintaining excellent rapport, he worked among the Wichita, Caddo, Creek, Shawnee, Pawnee, and many other groups.

Karl was a long time member and contributor to several professional societies including the American Anthropological Association, Society for American Archaeology, American Association for the Advancement of Science and Sigma Xi. In recent years, he had become an active member of the Texas Archaeological and Paleontological Society and the Oklahoma Historical Society. Just prior to his death, Karl had the pleasure of seeing in print his major work entitled "Wichita Kinship: Past and Present," written in collaboration with his wife, Iva. He was one of the prime movers in the formation of the Oklahoma Anthropological Society, serving as Secretary-Treasurer during the early months of its existence.

At the University of Oklahoma, within the past year, Karl had received a promotion from Assistant Professor to Associate Professor and was appointed as Curator of Ethnology for the University Museum. He was to have become Chairman of the Department of Anthropology, serving a four year term starting in the fall of 1952. His extensive research on the Wichita was largely completed and he had just undertaken a comparative study on Central Siouan social organization. The accident which took Karl's life has not only deprived all of us of an esteemed friend, but also terminated the career of a personality showing promise of continuing significant contributions to anthropology.

ROBERT E. BELL

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FACTS AND COMMENTS

PIT HOUSES OF ASIA — A JAPANESE PHASE

The discussion of pit houses in the Old World and in North America by Hiroshi Daifuku (*American Antiquity*, Vol. 18, pp. 1-7) prompts me to add a note concerning certain pit house sites which I explored in northern Japan during the spring and summer of 1951.

While searching the Yamagawa River Valley near Furumaki-machi in Aomori Prefecture for early Jomon sites, I encountered several pit house village sites. I had previously been advised of the general location of these by Major Howard McCord, formerly of Misawa Air Force Base, who had done considerable archaeological work in that region.

After finishing a project involving two large Jomon sites near Hachinohe City in Korekawa-mura, I returned to concentrate my attention on the pit house sites, three of which were located in the Yamagawa Valley and two other large ones on the east shore of Ogawara Lake. I selected one of the latter for initial testing. This was a site which had included nineteen houses. In one month, working week-erfds, I managed to explore four of these.

Measuring the pit house depressions in diameter, I noted that these averaged 22 feet across, from two and one half to three feet from normal ground level to the surface of the ground at the center of the depression. After clearing the floor of the house, it was noted that the rooms were circular. In one of the pits, heavy logs, preserved by charring were found on the floor. These, I concluded were probably either supports or ceiling beams. In the case of each pit, a fire-hardened clay basin outlined by ridges of the same material was uncovered on the floor adjacent to the northwestern segment of the wall. This seemed to be the hearth as it contained a heavy concentration of wood ash, charcoal and fire-broken stone. Leading from this hearth into the wall of the house, was a clay-lined flue which was connected with a vertical vent or chimney. The chimney, like the hearth and flue, was also clay-lined and was plugged with wood ash and dirt. It appeared that the chimney was so constructed as to permit the smoke to emerge outside of the house rather than through a "smoke hole" or doorway.

Scattered about on the floor of two of the huts excavated were a considerable number of iron fragments and slag. Two pieces of iron were recovered on one floor which, though badly oxidized, seemed to have been portions of weapons or implements of some kind or other.

Pottery constituted the bulk of the artifacts recovered. Sherds were concentrated most heavily in the neighborhood of the hearth bed and in one excavation, three complete vessels were recovered, all of these lying next to the hearth.

In general, the pottery involved three distinct types. The most common was a primitive, hand-molded, grit-tempered fairly hard ware usually made into cups and small pots. These were buff or orange colored and rather globular in shape. It was in this pottery that a clue to the chronological position of the pit house complex was detected. In examining the flat bases of this type of pottery, it was found that 85 per cent of them were decorated by pressing a leaf into the wet clay before firing. This trait is common to the Yayoi culture which flourished in southern and central Japan from about 500 B.C. to nearly 350 A.D. This feature of that pottery type was the only form of decoration which could be detected. The outer surface of the vessel had been scraped causing the tempering grit to be pushed through the clay giving it a scratched or striated appearance. The inner surface of this pottery was smooth, however.

This ceramic type is commonly known as Haji or Hajiki, although it is not by any means identical with the Kofun Period Haji ware of the southern prefectures.

The second pottery type in order of frequency of occurrence was a hard, grey primitive form of porcelain known as Iwaibe ware. This was found in considerable quantity in most of the pit houses, although on two smaller sites tested later, none could be found at all. Iwaibe pottery is known throughout southern Japan and most of Korea. The earlier Japanese form pertains to the Kofun (Tomb Age) and Asuka periods of proto-historic times. The first specimens were brought to Japan from Korea during the second century A.D. After that, kilns were set up in the vicinity of Nara, and the bulk was produced in Japan thereafter. The final form of Iwaibe is usually coated with a green ash glaze, this type being construed by many as the true ancestor to modern porcelain. The pit house Iwaibe pertains to the earliest type of the ware, sometimes called Sué or Sueki pottery, these being in the form of bowls and narrow necked bottles.

One additional pottery style was noted, this seemingly borrowed not from the more advanced southern cultures but rather from more primitive peoples, probably the Kamagaoka (final Jomon). This appeared as a black burnished ware usually in the form of a small flat bottomed bowl. These were undecorated. Later specimens appeared to have been wheel-made, a curious combination of borrowed traits.

The iron smeltering industry most certainly was borrowed from a more advanced culture. Iron did not appear in Japan in quantity much before the first century B.C., and probably the trait did not arrive in these northern lands until much later. A few fragments of obects were obtained from several pits, but the slag and oxidized scraps made up the majority of the iron industry finds.

The presence of the Iwaibe pottery suggests that the sites were probably occupied about 300 A.D. but not much earlier as this type of pottery was practically unknown in Japan much before this time. Earlier pit house sites do exist and in these, no Iwaibe and almost no iron has been found. The Haji ware of the pit house variety has been found in the stone age middens of Kamagaoka (Tengu Mori site, San-nohe gun, Aomori Prefecture) indicating a possible earlier contemporeneity with that culture.

According to Mr. Kasushige Kaneko, historian and archaeologist of the Kokogakuin University in Shibuya, Tokyo, pit dwellings are common to nearly all of the stone age periods (Jomon) of Japan, but unknown among the Yayoi.

In Hitchcock's study of the Ainu (The Ainos of Yezo, Japan; Smithsonian Bulletin 1892), it is noted that subterranean or semi-underground houses were known among the Koro-pok-guro of the Kuriles and also among certain related tribes in Siberia. He further states that "the Smelenkur of Saghalien lived in half underground dwellings" (p. 435). Early Japanese historical accounts describe the Tsushikari Ainu of Hokkaido as having lived in semi-underground houses called "toichioi." An ethnological publication produced in Sapporo in 1925 refers to the aborigines as "the pit-dwellers of Hokkaido."

Based on certain disclosures made in northern Japan in recent years together with what evidence I was able to secure, I feel that a thorough exploration of the pit house complex should be made as a possible approach toward solving the long standing Ainu problem. At any rate, I am positive that the Ogawara Pit House culture pertains to a level which existed in the twilight of Japanese prehistory and that it involved a people who were essentially a stone age group but who had arrived at a contact period where borrowing and trading had begun with a more advanced people. I further believe that at last we have found in this pit house culture, one of the earliest manifestations of the Ainu culture in Japan.

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August, 1952

COMMENTS ON THE CULTURAL POSITION OF THE BINTZ SITE, CAMPBELL COUNTY, KENTUCKY*

The ceramic material from the Bintz site, as MacCord has indicated, belongs to the Madisonville focus of the Fort Ancient aspect. He has given the Ceramic Repository for the Eastern United States at the University of Michigan a representative sample and in addition has allowed me to examine the negative painted specimens from the site. The pottery which is now available for study and my impressions of the site at the time I visited it indicate that it is more closely connected to Fox Farm than to Madisonville. The fabric impressed salt pan is more common at Bintz than at any other Fort Ancient site, and in this regard conforms more to the rare appearance of fabric impression on salt pans at Fox Farm. A common decorative style at Bintz is on vessels which can be called Madisonville Cordmarked. The incised decoration on these specimens is similar to that at Fox Farm (Griffin, 1943, Pl. CVI, Figs. 1-5).

The negative painted sherds are from bowls with the design placed on the inner rim. The exterior is identical to the Madisonville Plain bowl rims. In style these sherds conform most closely to Angel Negative Painted than to any other in the Southeast, but it is not suggested that these are trade specimens from the Angel site. One of the designs is made of small ovoids roughly 1 cm. long and 7 mm. wide in the natural color of the inner surface. There are three (?) horizontal rows of these ovoids on the inner wall. They are spaced 1 mm. apart horizontally and about the same distance vertically. The rest of the inner surface has been covered with a black film. Another design has a series of pendant triangles from a narrow buff zone at the inner lip edge. These are roughly isosceles triangles in black, some 2 cm. on a side. In the center of each is a small buff circle. Between the pendant triangles and separated from them by a narrow buff zone is a series of black, upward-pointing triangles with a central buff circle. Below this horizontal row is a narrow buff line, then a black, a buff, and another black horizontal line. A design is not distinguishable on three other negative painted sherds.

This collection from the Bintz site confirms an impression which has been developing gradually with an increasing familiarity with middle Mississippi pottery. Most of the southern and eastern Fort Ancient sites are much closer in their ceramic and other cultural features to middle Mississippi than they are to either Oneota or to Iroquois. Almost all of the sites I originally included in the Madisonville focus could be placed in middle Mississippi, as it is now understood, without difficulty. These sites are, of course, distinctive because of their temporal and areal position. An intensive survey and excavation program is badly needed along the Ohio comparable to those now being made in the central and lower Mississippi Valleys. The material from the Bintz site is indicative of the strong cultural connections between the Cincinnati and Evansville areas in late prehistoric times.

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"UNUSED" HAMMERSTONES

A number of archaeological sites, particularly in the northwestern part of the continent, have yielded smooth ovoid stones which look suitable in every way for use as hammerstones, but which show no signs of having been used. In excavating a site it is a common experience to come across one of these, thinking one has found an actual hammerstone, only to discover, after it has been washed, that it is merely an ovoid cobblestone. Yet it is quite clear that the stone is part of the archaeological series and not merely a stone lying *in situ*. So frequent are these in some sites that students on the dig have adopted the habit of calling them "unused" hammerstones.

* Reference here is to the site reported in this issue, p. 239.

When travelling down the Yukon River by boat in 1950, I was weather-bound at Lower Laberge, a small settlement at the north end of Lake Laberge, not far from the famous boiler in which Robert Service's character, Sam McGee, was reputedly cremated. On the lake shore was a camp site which had been used in the summer of 1949 by John Broeren, a half-breed, and his Indian wife. Lying near the spot where the tent had stood was a smooth oval stone about the size of a large man's fist, which reminded me immediately of the "unused" hammerstones. A few feet away I found a group of six or eight of them lying close together. Picking one of them up, I asked Broeren to explain what they were.

Quoting now from notes made at the time — "Jack explained that these were used in moose-hide tanning. After the hair has been removed, the black epidermis has to be scraped off. This process, which may take as much as two days, is much hastened if the skin is heated with these stones. The woman stands with her hands under the hide, black side up, and rolls the hot stone about, judging the degree of heat by feeling it through the hide. As the stone cools off, a new one is used till the whole hide has been treated. This process is used only for heavy bull moose hides, which are difficult to handle."

This treatment has the effect, he added, of making the epidermis hard and crumbly so that it is easy to scrape off. The stones must not be so hot as to scorch the hide.

I have no idea of the extent of distribution of this process but suspect that, like most skin-dressing techniques, it was well known and widely used. It may well be that we have here the explanation of at least some of the "unused" hammerstones.

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A DOG BURIAL FROM THE SACRAMENTO VALLEY

The partial dog skeleton comes from site SJo-68 (formerly C68) near Thornton, California. The remains consist of the cranium and mandible, the atlas and several cervicals, pelves, tail vertebrae, and two femora. These parts lay in anatomical articulation so that we may assume that the partly dismembered skeleton, still bound by integument, was buried. The archaeology of the site as known in 1948 has been published. (Heizer, 1949, p. 7.) The dog remains lay at a depth of thirty-four inches from the surface, solidly imbedded in calcareous hardpan, and in proximity to human burials. Indeed, the whole deposit was heavily charged with human skeletons, and it is reasonable to assume that the dog had been intentionally buried. Animal burials are not uncommon in later culture horizons in the same area (Heizer and Hewes, 1940).

The dog skeleton is in very good condition with no apparent distortion or deformation. It was possible to make certain significant cranial measurements. All measures are in millimeters.

Occipital length, including incisors, 185.0; occipital length, excluding incisors, 182.0; basal length, 164.0; condylo-basal length, 183.0; median palatal length, 89.7; width at canines, 35.5; width at M1, 61.0; width at mastoids, 62.0; width occipital condyles, 38.0; median length of nasals, 60.4; occiputnasion, 98.4; orbit to tip of premaxillary, 81.0; width supra-orbital process, 50.6; interorbital, 39.2; cranial height, 53.0; meatus to alveolus I1, 147.0.

Upper dentition; alveolar measurements: I1 to M2, 93.6; C to M2, 76.5; P1 to M2, 62.6; P2 to M2, 56.9; M1 to M2, 17.1; and length of P4, 18.6.

Mandible, alveolar measurements:

I1 to M3, 94.0; C to M3, 84.5; P1 to M3, 71.7; P2 to M3, 67.0; P3 to M3, 58.0; P4 to M3, 46.1; M1 to M3, 34.5; length of M1, 21.2; condylo-symphysis length, 130.0; and bicondylar width, 76.0.

The cranium is that of a fully-mature adult, the teeth show some, but not excessive, wear. None of the teeth is broken. The parietals are quite rough and a low crest is developed along the sagittal line. The post-orbital region is relatively bulbous.

The single mensurable long bone was a right femur, 167.0 mm.

All or nearly all of the measurements are quite close to the averages for a series of dog skeletons called the Large Kodiak Island dog (Haag, 1948, p. 190). Among aboriginal dogs, this is one of the larger dogs, being exceeded in size only by Siberian and Eskimo dogs. Only in size of the cranial vault was there considerable difference — the California specimen being smaller in cranial height and maximum cranial width. In some instances the measurements were within one millimeter of the average. The femur length is close to the expected size for so large a cranium.

This partial skeleton is of particular interest because it is the earliest evidence of this animal from the Early Central California culture horizon. Site SJo-68 has been dated by the radiocarbon method as 4052 ± 160 years old (Arnold-Libby samples 440, 552). The material dated was charcoal screened from the mound mass and so far as can be determined the human (and dog) interments are contemporaneous with the matrix in which they lay. Our belief is that the dog skeleton is about 4000 years old. This would be incompatible with the senior author's previous conclusions about the age of the Kodiak Island Large dogs, had his conclusions been based on anything more concrete than Hrdlicka's guess dates for Kodiak Island deposits. Previous conclusions about the age of this type dog must now be modified in the direction of greater antiquity. There is a marked uniformity of these dogs along the Pacific slope. Most specimens are from sites which may now be accorded fair antiquity. In view of the rather old radiocarbon dates (3015 ± 230 years) for the "pre-Aleut" culture of the Aleutian Islands (Arnold-Libby sample 409) and

STEMMED, INDENTED BASE POINTS

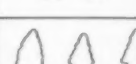
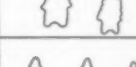
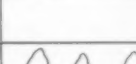
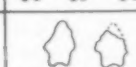
LOCATION	AUTHORITY	NAME	EST. AGE	SHAPE
Pinto Basin, Southeastern California	E. W. and W. H. Campbell, The Pinto Basin Site, Southwest Museum Papers, 9, 1935.	Pinto Points	About 10,000 B.C.	
Borax Lake, California	H. R. Harrington, An Ancient Site at Borax Lake, California, Southwest Museum Papers, 16, 1948.	Borax Lake Points resembling Pinto	Great Fluvial (late)	
Stahl Site, Southwestern California	A. Hamilton, Americas Oldest Houses, Natural History, XL, 8, 1951.	Pinto Points	3,000 to 10,000 years old	
Lower Basin of the Colorado River, Southeastern California	M. S. Rogers, Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas, San Diego Museum Papers, 3, 1939.	Pinto Points	200 A.D. to 800 B.C. (Revised in Ventana Cave report: 1,000-2,000 B.C.)	
Concho, East-central Arizona	F. Wendorf and T. N. Thomas, Early Man Sites near Concho, Arizona, American Antiquity, XVII, 2, 1951.	Part of Concho Complex	After 6,000 B.C.	
Ventana Cave, Southeastern Arizona	E. W. Haury, The Stratigraphy and Archaeology of Ventana Cave, University of New Mexico-University of Arizona Presses, 1950.	Amargosa II (Pinto)	Bryan, 1,000 to 2,000 B.C. Antevs, 3,000 to 7,000 B.C.	
Bluff, Southeastern Utah	Collected by Rev. E. Botelho; examined by H. M. Tormington; deposited in the Denver Museum of Natural History, 1952.	Pinto Points		
Glendive, Eastern Montana	W. Malloy and C. Lewis, Some Early Types of Points from the Lower Yellowstone Country, American Antiquity, VIII, 3, 1943.			
Lake Bonneville, Northeastern Nevada	E. W. and W. H. Campbell, The Pinto Basin Site, Southwest Museum Papers, 9, 1935.	Pinto Points		
Moapa Valley, Southeastern Nevada	E. W. and W. H. Campbell, The Pinto Basin Site, Southwest Museum Papers, 9, 1935.	Pinto Points		
Hells Midden, Northwestern Colorado	R. H. Lister, Excavations at Hells Midden, Dinosaur National Monument, University of Colorado Studies, Series in Anthropology, 3, 1951.	Stemmed, indented base point	1,000 to 1,500 B.C.	
Tabeguache Creek, Southwestern Colorado	C. T. Hurst, Surface Collecting on Tabeguache Creek, American Antiquity, XI, 2, 1945.	Pinto Basin types		
Upper Rio Grande Basin, Southern Colorado-Northern New Mexico	E. B. Renaud, Archaeology of the Upper Rio Grande Basin in Southern Colorado and Northern New Mexico, University of Denver, Archaeological Series, 6, 1946.	Rio Grande Points	Pre-Pueblo	
San Augustin Plains, West-central New Mexico	W. R. Hurt and D. McKnight, Archaeology of the San Augustin Plains, American Antiquity, XIV, 3, 1949.	Type 8a	Gap between the Folsom and recent horizons	
Grants, Central New Mexico	K. Bryan and J. H. Toulouse, The San Jose Non-Ceramic Culture and its relation to a Pueblean Culture in New Mexico, American Antiquity, VIII, 3, 1943.	Part of San Jose Complex	Correlates with Chiricahua stage of Cochise	
Central Texas	E. B. Sayles, An Archaeological Survey of Texas, Medallion Papers, XVII, 1935.	Brazos River Types Round Rock Types	Equates with Ft II Equates with P II	
Central Texas	J. C. Kelley, The Cultural Affiliations and Chronological Position of the Clear Fork Focus, American Antiquity, XIII, 2, 1947.	Pedernales Indented Base Point	4,000-2,000 B.C. to 1,500 A.D. (Ray estimates at close of Pleist.)	

FIG. 90.

the probable equivalence of this horizon with the lower levels of the Uyak Site on Kodiak Island (Hrdlicka, 1944; Heizer, n.d.), the Large Kodiak type of dog was probably living in Alaska 3000 years ago. This suggestion narrows the Sacramento Valley-Kodiak Island time gap to not over 1000 years.

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THE STEMMED, INDENTED BASE POINT, A POSSIBLE HORIZON MARKER

Has the time arrived when we can set up another horizon marker in the archaeology of western United States? An examination of the literature reveals that a projectile point which we will call the Stemmed, Indented Base Point may be so considered. This short note contains a compilation of but some of the references to this type of point in western United States and is written in hopes of stimulating comments and additional information. No attempt has been made to present an exhaustive distributional study of this artifact, but the accompanying chart lists some of its reported occurrences in order to point out its wide geographical spread as well as its estimated age and various terms by which it is known.

Of course, the question of the relationship of these points to one another is of paramount importance. In general shape the points appear to be very similar; however, written descriptions note secondary differences which may be quite significant. Fundamentally the points have the following features in common: A stemmed point with triangular body; stem narrower than body and usually parallel-sided; base of stem fairly deeply indented. Some differences noted include: The technique of chipping would appear to include examples, such as the Pinto Points, which feature percussion flaking, and styles, found in Colorado and Texas, which exhibit rather fine secondary chipping suggesting pressure flaking. Some specimens have stems with smoothed lateral edges, while others do not possess this feature. Serrated blades are characteristic of some of the points, while others have relatively straight blade edges. The points also vary a considerable amount in size.

Hurt and McKnight (1949, p. 191) have presented a discussion of the age of the Pinto type artifact fairly recently. They point out that estimates of age vary a great deal. This is also evident from an examination of the accompanying chart. However, there does seem to exist a consensus of opinion which would place the artifact in question between the Folsom and recent horizons. It is for this period, formerly spoken of as a "gap" in western archaeology, that the Stemmed, Indented Base Point would appear to serve as a horizon marker.

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TWO SITES IN WESTERN BOLIVAR, VENEZUELA

The site of Cedeño is on the south bank of the Orinoco River, approximately 1 km. northeast of the boat landing area of the town of Caicara. The Orinoco at Cedeño is marked by a series of boulders that reach, from the south bank, 100 meters or more into the river. These are uncovered during the summer (dry season) and contain petroglyphs in the form of spirals, mazes and other figures. The river at this point is marked by vertical banks 3-5 meters high. The top of the vertical bank represents the usual high-water mark of the Orinoco; beyond this bank is a more or less level stretch of mixed fields and woodland. The river banks extend in two stages to a sloping river beach. As the water level of the Orinoco varies 10 meters or more between wet and dry season, this beach is above water for a considerable distance during dry weather.

No aboriginal structures of any sort were found at Cedeño. The sherd area extends for some 250 meters along the river front. The sherds wash out of the river banks at the bottom of the first vertical cut, at a point from 1 to 1.5 meters below the top of the bank. In widening its channel, the Orinoco is slowly destroying this site.

The extent of prehistoric settlement inland from the river is unknown. Excavation for a (now deserted) oil storage tank, at about the middle of the sherd area and some 100 meters from the banks of the river, turned up a number of sherds. While digging the foundations for a house in the town of Caicara during 1951, sherds and other objects were found by the workers, but these were not examined by the writer. This particular area is more than a km. from Cedeño and several hundred meters from the Orinoco.

A partial survey of the Cedeño site was made by the writer in the winter of 1950-1951. No excavation was made but a collection of some 300 sherds and other ceramic objects was taken from the river area. Sherds were found only in places where the soil had been disturbed by digging or where there had been river action.

As there was no stratigraphy, analysis of pottery could depend only on typology. Typological comparison demonstrated a general similarity of the Cedeño material to that of the site of Ronquin, partially excavated by Howard in 1941, on the Orinoco a hundred km. to the east. It was found possible to classify the ceramic material under the two major styles outlined by Howard from Ronquin material (Howard, 1943, pp. 22-32). It was decided, however, to avoid comparison of types within these styles due to the smallness of the Cedeño sample.

Most of the ceramic materials at Cedeño were placed in two types, both of which could be attributed to the late Ronquin ceramic style.

Type 1. A thick grey to brown ware. The paste is coarse and non-homogeneous. It contains a considerable number of carbonaceous material and large pieces of sand and feldspar. Many pieces of this pottery show differential firing. The cores of the sherds are dark from the organic content and from insufficient firing. This pottery type is monochrome and unslipped. A striking feature of all pieces is the inclusion of rod-shaped sponge spicules of the Genus *Spongilla*.* These sometimes occur in large bundles, oriented longitudinally. The clay of type 1 was probably a river silt in which sponge spicules often occur. There seems to have been little attempt at sorting or sifting the clay.

Wall thickness of the sherds average 5-10 mm. The vessels were primarily flat and round-bottomed ollas with flat-bottomed bowls also represented. Rim forms are recurved. Most examples are thick-lipped and have a sharp interior angle. Where the lip is thinner there is the effect of an interior carina. One piece, a decorated incised sherd, has a well defined carina which forms part of the decorative motif. Other atypical examples include a wide recurved rim, a recurved rim with extra thicken-

* Identification of these spicules made by Donald South, Department of Geology, University of New Mexico.

FIG. 91. *a*, Animal head handle, early Ronquin, Cedeño; *b*, modelled human faces, type 1, late Ronquin, Cedeño; *c*, incised sherd, type 1, late Ronquin, Cedeño; *d*, figurine, type 1, late Ronquin, Cedeño.

ing at the outer face, and a thickened rim with interior carina.

One small vertical loop handle and a number of lugs, usually in zoomorphic form, were found.

Approximately 15 per cent of type 1 sherds were decorated. The most common decoration was in the form of appliqued ridges and rounded protruberances impressed with lines of dots or with a "dot in a circle" motif, made, apparently, with the end of a small reed or cane. Other decorative features include coffee-bean modeling, usually with the beans grooved. Four sherds showed parts of faces. These had eyes formed of grooved coffee-beans, eyebrows of appliqued punctated ridges, and noses of modeled mounds of clay joined to the ends of the eyebrows. Lips were separate appliqued strips.

Five sherds showed examples of narrow-lined shallow incising in geometric designs, usually near the rim of the pot. Two of these are interior; most of the other decorations are on vessel exteriors. Incision takes the form of continuous zigzag lines, interwoven with short horizontal and vertical lines to form squares, triangles, and rectangles. Occasionally lines of dots, punched in the clay, will overlie one of the incised lines or will be interspersed with the incised elements. One of the incised pieces found at Cedeño has, essentially, the same motif as a piece pictured by Petrullo from Arauquin. (Petrullo, 1939. Pl. 32, Fig. j.)

Other decorative features include zoomorphic and anthropomorphic heads in rim decorations. These are crudely made; the eyes and mouth are produced by pressing with a wedge or (for the eyes) by the use of a circle and dot. Nose and ears are pinched from the base clay of the figure.

Type 2. This type of pottery is light terra cotta in color. It is extremely chalky to the touch and crumbles readily. The color extends completely through the pot walls which are 5-8 mm. thick. This pottery is very well fired and is quite porous. It is possible that type 2 contained vegetal matter, destroyed in the firing but giving the vessel its considerable porosity. Clay of this group is well sorted. Temper is sand and feldspar and large numbers of *Spongilla* spicules are again present. These are more fragmental than in type 1 and in some specimens are almost completely pulverized. This suggests careful grinding of the clay before the admixture of the temper.

All type 2 rims are recurved with thick lips. Vessel forms were probably globular jars or ollas. No sherds from vessel bottoms were found. Only two sherds are decorated. There is, however, an adorno of this type, a modeled zoomorphic form, 5 cm. high. In this animal figure the nose is represented by a nubbin of clay, and the mouth by a shallow incised line. Eyes are made by deep narrow incised circles with eyes punched in the centers.

Two figurines were found at the Cedeño site. One of these is a torso of a nude female, 9 cm. in height and 3.5 cm. thick. The body is tubular with little attempt to follow body contours. This figurine is type 1 in clay, temper, sorting, and firing techniques, and in the presence of uncrushed *Spongilla*. The figurine has shallow depressions where arms, legs and head once were joined to the torso. These have all broken away smoothly, except for the remnant of one arm. The only body features represented are the breasts, made with appliqued mounds of clay, the navel, by a shallow depression, and the genitalia, by a punctated impression.

The second figurine is a torso with one leg attached. It is terra cotta in color and of a chalky, highly fired pottery. This figurine would probably be classed with type 2 pottery. The present length is 8 cm.; the body is 4 cm. wide and 1.5 cm. thick. The piece is extremely battered and most features are gone, but it probably represented a nude female.

Only eight examples of pottery that belonged to the early Ronquin style were found: five of these are parts of lugs or handles and two others are rims. These sherds are well fired and are red-brown, with the color extending evenly through the sherd wall. The examples have numerous inclusions of quartz and feldspar and these seem to have been deliberately added as temper. The paste for this pottery type had been carefully sifted and may have come from a clay pit in which fine sorting had already taken place. This type does not contain sponge spicules.

One of the rims found is a recurved thick-lipped type, and the other is wide and recurved. The latter contained wide shallow incisions, spaced diagonally around the inside of the rim. Vessel shapes could not be determined. The modeled pieces include a vertical loop handle, a vertical ribbon handle, and a squared knob lug. Another handle is zoomorphic; an animal head, flattened and snub-nosed, with eyes formed by shallow incised circles, each with a punctated dot in the center.

Three arrow straighteners of stone were found. These are irregularly shaped pieces, one of granite and the other two of gneiss. The depressions crisscross and are *ca.* 1 cm. wide and from .5 to 1 cm. in depth.

The Punta Brava area is 18 km. east of Caicara on the Orinoco near the mouth of the Cuchivero River. Sherds were found in a dry wash about 150 meters from the south banks of the Orinoco on farm lands belonging to Sr. Marcos Herrera of Punta Brava. The area was difficult to explore because of the thick undergrowth, but a number of sherds and one figurine (possibly an adorno) were picked up along the dry watercourse. Size of the site is unknown. No structures were noted and no stone artifacts were found. Pottery is Late Ronquin in style and both Cedeño types 1 and 2 are represented. The figurine, 6 cm. high and 5 cm. wide, is badly battered, both arms and one leg having been broken off. The head is wedge shaped, 4.3 cm. in thickness. The nose is formed by pinching out a piece of clay from the head; the eyes and mouth by wedge shaped impressions. Immediately back of the eyes are dot and circle imprints, probably to represent ears. The figurine face is oriented at almost a right angle to the body; in other words, placed on top of the head.

Charles Olvey, a missionary stationed at Caicara, uncovered a number of rim decorations and figurines while digging in a dry wash near Las Trincheras in the Caura River valley. These objects were encountered at some depth below the surface. The writer had a chance to examine three of the specimens. Two are human figures, rim decorations, grey-brown in color with crudely modeled features. They resemble similar decorations of type 1 at Cedeño. The third object is a zoomorphic form, perhaps a monkey. It is a somewhat bulky figure, 5 cm. high, 6.5 cm. thick, and 5.8 cm. wide. The color is red-brown. This piece is quite reminiscent of adornos common to the Barrancos area.

PERCENTAGES OF SHERDS

Cedeño	*Number*	*Per cent*
Late Ronquin		
Type 1 decorated	38	12.9
Type 1 undecorated	226	76.6
Type 2 decorated	3	1.0
Type 2 undecorated	20	6.8
Early Ronquin		
Decorated	6	2.0
Undecorated	2	0.7
Punta Brava		
Late Ronquin		
Type 1 decorated	2	3.0
Type 1 undecorated	63	95.5
Type 2 undecorated	1	1.5

Because of the small ceramic samples at Cedeño no formal listing of style difference between Cedeño and Ronquin can be made. The most important variation, perhaps, was the use of red and white paint on vessel walls; found in the early levels at Ronquin but missing at Cedeño and Punta Brava. Less than 3 per cent of the Cedeño sherds, however, belong to the early Ronquin style and this style was completely missing at Punta Brava. At Howard's site early Ronquin (as the name implies) pre-dates late Ronquin but it is unclear to what extent the early pottery is ancestral to the later group. Early Ronquin ceramics at Cedeño might possibly represent trade ware though excavation will perhaps reveal more material from this period.

A tabular listing of similarities between ceramic styles at Ronquin and Cedeño include:

Late Ronquin

Paste

Fribility
Presence of *Spongilla*
Gray to buff surface color

Vessel shape

Predominance of flat based bowls or ollas
Globular jars
Flattened rims with or without interior carina

Decoration and special features

Rectangular narrow incised designs
Impressed circles (made with hollow reed)
Modeled biomorphic lugs
Plain lugs
Appliqued decorations on vessel walls

Early Ronquin

Paste

Red core
Quartz inclusions in clay
Lack of *Spongilla* in paste (in contrast to Late Ronquin)

Vessel shape

Thick lipped rims

Decoration and special features

Wide shallow incising on rim
Incised circle with inclosed dot
Zoomorphic handles
Loop handles
Ribbon handles
Knob-shaped handles

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BEVELED OR "ROTARY" POINTS

Campbell and Ellis in their article on the Rio Grande Atrisco Sites (*American Antiquity* Vol. 17, No. 3, 1952) say: "Perhaps the most interesting characteristic of the type (5 out of 8 specimens) is its tendency to show a definite rifling or beveling which would presumably *insure its whirling in flight*." This is an amazing statement to find in a serious report made by two competent modern archaeologists.

Beveling the edges of points is a very ancient trait. Fluted points have been found with beveled edges. However the reason for this beveling was *not* to insure the spinning of the shaft in flight; beveling is not productive of that effect. In fact, aerodynamically, there is not enough force generated against the surface of these bevels on any point small enough to serve as an arrow or atlatl dart tip, to spin the shaft. Spinning is achieved by the set of the feathering, but we know of no use of unfeathered arrows on this continent. Even the early atlatl darts seem to have been feathered at the nock end.

This fable about "rotary points" was old when I was a lad. I doubted it for two good reasons. First, practically all the beveled points found in Ohio were much too large and heavy to tip an arrow. Second, the men who told the tale, and even put it into print, had never shot a bow. I had. I belonged to a small group of lads my own age who hunted with the bow and with small throwing spears thrown with a knotted thong. I fletched my own arrows and even forged out the socketed steel heads for them and the throwing darts. We were also all "relic hunters" though most of the good material found wound up in my own collection, usually in exchange for some of my steel tips.

In 1908 I decided to test the theory about rotary points. I did not want to risk breaking any of the precious beveled points I had found or traded for, so from plate glass I made duplicates of all I had or had seen figured. As feathering the shaft would spin it, I made "bobtails" — arrows without feathers — much thicker at the tip than at the nock end, like a crossbow quarel. I painted the chipped portions of the plate glass points black to avoid any sparkle. Any flashing would thus be from reflection from the flat faces turning in flight.

To observe the effect in flight, these arrows were tested in three ways. I would shoot straight up, and watch the arrow as it came down under gravity alone. Or I would ask one of my friends to shoot these arrows directly toward me at sufficient range to enable me to dodge aside, or he would shoot past me so that I could observe at right angles to the line of flight. If the shaft spun in the air it could be told by the regular flashing of the flat faces in the sun. Because these arrows were "bobtails" they wabbled longitudinally, but in no instance was there any regular spin to the projectile, as is the case with a properly armed and feathered arrow. The beveling had no effect on the flight of the arrow.

When I had finished the series of experiments I was satisfied that beveled points of the size found in Ohio were never intended to tip arrows. They were so large and heavy that the arrow was out of balance and traveled a relatively short distance, and they had little penetrating power. The same bow that would sink a proper arrow up to the feathers in a carcass, could not drive one of these big rotary points through the hide.

In the Southeast, a great many small beveled points are found that are of the proper size and weight to have been used to tip arrows or atlatl darts. Most of these belong to the small, side notched, barbed-below-base type; many of these are made of a poor grade of quartzite. Why are they beveled? The answer is simple. It takes less skill to shape a rough blade by beveling than to flake a median edge in an exact shape. This is especially true with a refractory material like quartzite or a poor grade of chert.

To shape a small beveled point, the artisan first shapes the base and notches, then holding it, point toward him and base out, between left thumb and bent forefinger he beveled the edge with an upward pressure of his flaking tool of bone, antler, or hard wood. (In my own experiments shaping plate glass I used a dead knot from a pin oak). Leverage was gained by the right thumb pressed against the left fore knuckle. This process is quite rapid. When one edge was shaped the artifact was turned over and the other edge done in the same manner.

To resharpen a large knife, the stone blade was held the same way with the short haft outwards. I do not claim that all large beveled points were knives. The same point in a short haft would be a knife, while in a long shaft it would be a spear or dart point.

To resharpen the point of an arrow or dart that had been damaged slightly, the artisan used this same technique, but as the length of the shaft made it inconvenient to hold it with the point towards the workman it was held point out. Then the technique resulted in a point that was beveled on the right hand edge when looking towards the point end. Every collection contains points that show this type of resharpening. Which side the bevel was on did not matter as the primary object of the point was to pierce.

I say that these beveled Atrisco type points and the beveled fluted points are merely specimens that have been resharpened while mounted and that originally they were of the normal unbeveled type.

In any area in which large beveled points are common, it is possible to pick out a series all with the same exact basal type and flaking technique on the blade but which range from thin-edged specimens with an excurvate blade and a lenticular cross section to those with steeply beveled edges and incurvate blades. The series can be carried further to include those that have been broken and resharpened until they are mere pointed stubs, often with one or both barbs broken off in the resharpening process. The first beveled point I ever found had been resharpened until the edges of the blade were even with the neck. Others having had the point broken have been beveled on one edge around in a semicircle to form a scraper. These always show a bit of the bevel on the other edge.

These beveled artifacts always have a strongly ground off edge to all portions of the base and stem that would put a strain against the lashings, evidence that they were primarily hand tools, not projectile points.

Lashed into a short haft, one of these beveled artifacts makes the finest tool ever invented by stone age man for flaying the hide from a carcass. I have skinned everything from muskrats to steers with them. They are handy tools for scaling and cleaning fish. For working wood they are very efficient. The Indian did not carve and whittle wood as we do, he sawed it and scraped it into shape or filed it with a piece of stone. One of these beveled artifacts makes a fine tool for woodworking — saw the twig to length with the edge and scrape the bark off with the same tool. In fact they were a primitive Boy Scout knife.

The fable that beveled points were made in that manner to spin an arrow in flight is in the same category as the fable about the Mound Builders tempered copper, and the one about chipping arrowheads from red-hot flint with an icicle. Let us forget them or leave them to the writers of filler pieces for the Sunday Supplement.

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A STONE CARVING ON THE GALAPAGOS

A stone face about 2 m. high was observed and photographed on Floriana (Charles) Island in the Galapagos by Philip H. Lord while on a cruise in February, 1949. The face was reported as being at an elevation of between 300 and 400 meters at which altitude potable water occurs. Within 100 meters is a small cave containing marine shells, whether naturally occurring or transported not being determined. The face is covered with lichen which may provide a further clue to its antiquity.

FIG. 92. Effigy head from Galapagos.

During the historic period a number of whalers have been marooned on Floriana Island which is currently inhabited. The Galapagos are volcanic islands of Quaternary — Miocene age. Floriana Island is chiefly andesite and basaltic andesite flows, somewhat harder than whalers' scrimshaw.

No other evidence of possible aboriginal inhabitation of the Galapagos has been reported. Figure 92 is made from a photograph taken by Philip H. Lord.

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A RE-EXAMINATION OF THE DATING EVIDENCE FOR THE LAKE MOHAVE ARTIFACT ASSEMBLAGE

The dating of the Lake Mohave artifact assemblage relative to the fossil beaches on which the material was found has been in dispute since Malcolm Rogers (1939) published a monograph disagreeing with several findings given in the original report (Campbells, Antevs, Amsden and Bode, 1937). Mr. Rogers' critique was never answered by the original authors, and his findings have been accepted consequently by most authors who have attempted summaries of the material (Martin, Quimby and Collier 1947, p. 437 and Fig. 122; Wormington 1949, pp. 84-87; Roberts 1951, p. 126). Rogers agreed with the Campbells that the great majority of the artifacts found (Rogers, p. 42, puts it at 95 per cent) are restricted to the surfaces of the fossil beaches. Rogers questioned, however, the Campbells' conclusion that human occupation was contemporaneous with times when the lake stood at the overflow level, which is that of the beaches. Rogers' most crucial evidence was given as follows: "There is splendid evidence that this condition did not prevail, because of the presence of a large encampment on the 937'-940' bay bar which extends directly across the outlet channel. Man could not have camped in this section during any period of overflow." (Rogers 1939, p. 43). This "beach bar site" was previously reported by the Campbells. Rogers' statement, in contrast to Bode's original determination (Campbells et al., p. 108), implies that the bar actually blocks the old outlet, and thus that it, and its occupational evidence, must postdate the period during which the lake overflowed.

In November, 1950 Mr. and Mrs. Stuart Peck, members of the Archaeological Survey Association of Southern California, and the author rechecked the outlet end of Lake Mohave and spent some 60 man-days in surface collection in an effort to decide the disputed points. I summarized our results in a paper at the AAA meeting at Berkeley in December 1950. Further work which we contemplate in the area has not yet been done; this note is presented in hopes of clarifying the situation before the literature on this site is further augmented.

Our results can be stated simply. We found an outlet channel along the west border of the beach bar as indicated in Bode's map, and we checked its constant level by instrument. This channel is shallow and meandering but definite; it has not been confused by the new drainage channel cut in 1916. Thus Rogers' claim that the occupation on the beach bar could not have occurred during overflow of the lake seems unfounded. We also conscientiously searched both the "beach bar site" and many other areas for artifacts away from beach levels, and came essentially to the same conclusions as all previous investigators, that artifacts are found almost exclusively on beaches.

The evidence that the Lake Mohave artifact deposits were laid down during the life of the lake seems to me excellent. The area of the beaches in the Lake Mohave basin cannot constitute more than a hundredth part of the surrounding habitable area. If we accept Rogers' figure of 95 per cent as the proportion of artifacts found on beaches to 5 per cent for those found in other situations, as well as the fact that nearly every area of gently sloping beach yields artifacts, I cannot conceive what factor other than nearness to water, and perhaps to consequent food, could have caused such a settlement pattern. The fact that the deposits are on wind-degraded land surfaces, and thus far have not been proved to have depth, does not of itself invalidate them as evidence of a single continuing occupation; there is every reason to believe that the artifacts have settled vertically but seldom been transported horizontally. Even sealed cave strata are subject to the same basic uncertainties as to duration of depositional time as are surface deposits,* and the Lake Mohave beaches are far easier to date climatologically than are most other types of site location, caves for example. Archaeologists cannot afford to be too restrictive as to the type of evidence they will accept as long as they depend on other sciences for their time placements. Soundness of judgment is not always a direct function of conservatism, as the history of the study of early man in America abundantly demonstrates!

Ernst Antevs (1952) still believes that the Lake Mohave beaches were formed during the wet period which accompanied the last deglaciation, and that the artifacts derive from the last part of the overflow stage and are about 9000 years old. He believs that, during the period of human occupation, the lake shrank to a lower stage during the annual dry season. Such an annual change in lake level allows a ready explanation of the very sparse, but definite, remains of man found below the beach levels. Antevs' climatic sequence, arrived at before radioactive carbon dating was available, seems thus far to be gaining confirmation as new dates are determined. With the great uncertainties which still characterize the dating of archaeological finds of these periods in the California desert area, it seems unwise to discount unnecessarily one of our few good clues.

* Although stratified deposits can be separated in chronologic sequence from artifact assemblages found above and below them, the depth of deposit in itself gives no real clue to duration of depositional time.

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CONCERNING THE EXISTENCE OF THE PIT HOUSE IN SOUTH AMERICA

With considerable interest I have read Daifuku's "The Pit House in the Old World and in Native North America" (*American Antiquity*, Vol. 18, No. 1, pp. 1-7, 1952). Although he did not refer to South America except in passing, citing only the finds of Bird in northern Peru, it is of interest to point out that there are numerous ethnographic references to the use of the pit house in the southern half of this continent, and that these references are confirmed by archaeological finds.

Metraux (1929) in his study of the Huarpe, primitive inhabitants of the Cuyo region of Argentina, gave a summary of the definite references to the use of the pit house in South America and attached a distribution map. He listed, in addition to the Huarpe, the Kaupe, Tsirakua, Matsikui, Kitsua de Cojata, Obacoatiara, Guaranaguacu, Piraguayguaquig, and Wayana. The first three are found in Paraguay; the remaining four are in eastern Brazil. For some of the tribes mentioned the references in question are very clear; for others, such as the Tsirakua and Wayana, they are doubtful.

The most complete historical descriptions, about which there exist the greatest number of documentary sources, are those which refer to the use of semisubterranean dwellings by the Comechingones who inhabited the mountains of Cordoba at the time of the Conquest.

Serrano (1945) gives a good summary of these sources. We have excavated some of the Cordoban pit houses in the Villa Rumipal site (Gonzales, 1943). It is very interesting to remark that the Comechingones also use their dwellings as sweat houses or steam baths.

In the Diaguita region of northwest Argentina, the use of the pit house was apparently very common in pre-Spanish times. During a recent archaeological investigation carried out with the aid of Wenner-Gren in the Hualfin Valley, Catamarca province, we excavated several distinct types of semisubterranean habitations. The most interesting and least-known type was found in the vicinity of Condorhuasi. This, before, excavation, appeared to be a huge depression in the natural soil which the natives regarded as the remains or remnants of an ancient aboriginal water reservoir. Excavation showed a pit house whose dimensions were 14.5 meters by 17 meters. In the floor there was evidence of a great many post holes, some carbonized posts still *in situ*, large storage pits or silos for storage, and several hearth sites. The number of hearths and the large size suggests a habitation of communal type. The floor of this structure must have been more than one meter below the level of the surrounding terrain. More to the north we excavated a second habitation of this same type, and we counted more than a hundred similar depressions between Condorhuasi and Las Barrancas. In the same valley there exists another type of pit house, chronologically more recent, smaller than the earlier type, measuring 3 by 5 meters. The floor is found at a shallower depth than is described for the first type, and the base of the walls is delimited by heaped up stones. The most unusual detail is the presence of an elongated entryway, which in one of the measured examples was only 25 cm. wide, from which we suppose that it could better serve as a ventilator than as a true entrance. Finally, a third type is similar to the last described but lacks the stone base for the walls.

Beyond northwest Argentina, Bird (1938) excavated a very primitive pit house in Tierra del Fuego. This type is of circular plan, with a diameter of 12 to 18 feet, with a depth of 3 feet. On the Chilean coast, north of the Fuegian Archipelago the pit house was apparently used by the Chonos according to a reference given by Father Rosales (Canals Frau, 1945, p. 25). To the north of Patagonia, in the Neuquen territory, Dr. Joaquin Frenguelli (ex-director of the Museum of La Plata) in a personal communication reports that the pit house is still in use.

There is no doubt that in South America there was used a great variety of the structures which are generically designated by the term pit house or semisubterranean dwelling, by peoples of very distinct cultures and in different periods of time. Only when we study the distinctive variants and their temporal and special distribution, will we establish with strong probability of certainty, which types diffused transcontinentally and which can be credited to reinvention.

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BOOK REVIEWS

Essays on Archaeological Methods, Proceedings of a Conference held under Auspices of the Viking Fund. Edited by JAMES B. GRIFFIN. Anthropological Papers of the Museum of Anthropology, University of Michigan, No. 8. Ann Arbor, 1951. v + 151 pages. $1.50.

Archaeologists have always shown themselves ready and eager to take advantage of scientific techniques. But it is one thing to send samples to a specialist for identification, and quite another to attempt to understand the basic principles of techniques in order to apply them intelligently in the solution of general problems. *Essays on Archaeological Methods* indicates how far the archaeologist has advanced toward the latter level.

Many of the twelve papers are by specialists reporting on specific investigations. They do not exhaust the uses of scientific method in archaeology, but they afford clear-cut examples and show the range of applications — in the field, in the preservation of specimens, in dating, in identification of the materials and techniques of arts and industries, and in the analysis and summarization of data. The discussion by participants of the conference reflects the interests and attitudes of archaeologists and includes pertinent questions and constructive suggestions. A number of recent papers are listed in the useful bibliography.

The keynote of the conference is struck in Frederick Johnson's "Collaboration Among Scientific Fields with Special Reference to Archaeology." This is an excellent statement, and Johnson speaks from experience in collaboration on the Boylston Street Fishweir and on Grassy Island. It may seem overoptimistic to hope that the results of collaboration can be equally fruitful to the archaeologist and to participating scientists, but we have the example of the late Kirk Bryan, whose enthusiasm testified to the satisfaction a geologist can find in archaeological problems. The value of scientific methods to the archaeologist depends in large measure on the spirit of collaboration. Johnson's statements are so fundamental that I do not hesitate to quote: "There can be no greater aid to a collaboration than the possession by the participants of, as a minimum, a sympathetic understanding of at least the theoretical background of the fields involved. Such an understanding indicates the range of the subject matter and the limitations of the results, and makes possible the mutual understanding of the methodology used by each participant. . . .

"Another point is that an archaeologist, or any one else for that matter, should not present his collaborating colleague with a mass of samples or specimens and a sheaf of undigested field notes and expect him to answer all, or even a few, questions. To do this is to expect a miracle, and furthermore this is the opposite of the idea of collaboration. . . .

"The collaboration must be carried through all the steps in the research. The participants must understand how each one processes his data and compiles the results. In each of these stages the interchange of ideas is essential, and the success of the venture depends largely upon a mutual understanding and tolerance of everyone's trials and tribulations."

A review of the technical papers can do little more than indicate the subjects covered because so many fields are included. Moreover, when an investigation is well conceived and reported with the caution that is bred of laboratory experience, controversial matter is reduced to a minimum.

Two papers deal with field methods. Albert Spaulding reviews various surveying methods, comparing them with respect to accuracy and convenience. Waldo Wedel describes the Missouri River Basin Survey. This is a far call from the whiskbroom and trowel, but the advantages of earth-moving machinery in working Plains sites which Wedel brings out are of more than passing interest.

In the field of preservation of specimens, Junius Bird describes his experience in handling Peruvian fabrics from midden debris of the Cupisnique-Chavin period, and acknowledges aid received from the Textile Museum in Washington, D.C.

A paper by Rutherford Gettens on mural paintings covers types, deterioration, and principles and materials of treatment. The conservation of murals is a difficult problem with which the archaeologist is only infrequently confronted, but he cannot always anticipate when the occasion will arise, and it is important that he understand basic principles in order to avoid needless loss. Quite aside from this consideration, Gettens' review of the properties of synthetic adhesives and lacquers is of general interest. New plastics are coming into the market so rapidly, we need the advice of a chemist who has tested them for our purposes and can explain their basic properties and relationships.

In the matter of dating, Carbon 14 at present holds the spotlight. There are more recent discussions and critiques of the subject than Donald Collier's paper in this series, but he gives an interesting review of the history of the method and a clear discussion of principles.

Sherburne Cook's "Chemical Analysis of Fossil Bone" describes in some detail investigation undertaken jointly by the Departments of Anthropology and Physiology of the University of California to determine the possibilities of relative dating of bone by its composition. Using bone from early, middle and late California sites, Cook and his associates studied changes in organic and inorganic content and in water. Cook also describes the results of studies of electron micrographs of bone and considers the value of flouride content in demonstrating whether or not bones from the same site had the same history.

Many analytical methods are applicable in the study of artifacts. Perhaps it is a reflection of the richness of the possibilities afforded us by the various sciences that some methods, for example x-ray diffraction and differential thermal analysis, which are far from unimportant, were not mentioned during the conference. The nature of

the artifact and the data desired dictate the choice of methods. The aim may be to define and differentiate precisely, to establish a class that has chronological or geographic implications, to distinguish local from foreign products, to locate the source of objects, or to study the development of a technique or industry. If the problem is at all complicated, a combination of analytical methods is desirable, hence the analysts' need of understanding the questions that are involved and the relevant field data.

Only one paper among the essays is devoted primarily to discussion of a method. Paul Titterington describes x-ray as a photographic process for demonstrating cavities and drill holes. He calls attention to its limitations: usually it does not show flint nor differentiate between the metals. He mentions that it will distinguish shell and "grit" temper in pottery, but this can be done microscopically much more quickly.

William Root reviews metallurgical analysis of archaeological objects, indicating the place of spectroscopy, quantitative chemical analysis and metallographic examination of polished sections. He brings out the importance of identification by illustrating its value in locating sources of copper objects, and also gives careful consideration to the limitations of metallographic analysis. Root believes that with sufficient data it will be possible to work out a fairly accurate picture of the metallurgy of a region. He also notes that the methods used by the metallographer do not give evidence of age except indirectly. The problem of dating is prominent in archaeological research, but Root's discussion may well remind us that the value of a frame of reference depends in some measure on the richness with which it can be filled.

Ceramic technology is a field in which many analytical methods are applicable and many purposes are served. Frederick Matson outlines the subject broadly. Throughout his discussion he reminds us of the importance of remembering the potter, with her problems, aims, techniques and superstitions. Since ceramic studies have been heavily weighted on the taxonomic side in America, it is worth while to have other approaches emphasized, and Matson's discussion is given point by telling illustrations from his Near Eastern studies. Matson's outline of the purposes of ceramic technology is one of many possible evaluations. Experience inevitably influences judgment. Had Matson worked mainly on American materials rather than on Near Eastern materials, it is unlikely that he would have given the secondary place that he did to the differentiation of local and imported pottery. Differences in evaluation indicate the importance of flexibility of method and alertness to new problems and procedures.

Matson reviews briefly most of the methods that have been employed in ceramic analysis, giving particular emphasis to an approach which he thinks has been neglected: testing the clays of a locality and comparing fired clays and local objects. Such emphasis is always made at the risk of giving a false impression of the relative value of methods. The comparison of clays and pottery is not always a simple matter. For example, tempering material alters the firing properties of a clay, and in order to make a reliable comparison, one should commence with a microscopic examination of the pottery, identifying the temper and estimating its grade and amount.

With regard to Matson's references to the estimation of firing temperature from the color of clay, it is important to recognize the complicating factors. For example, many clays do not change appreciably in color over a range of several hundred degrees within the upper temperature range of open firing. Also, if the paste is not fully oxidized, which is often the case, time, firing atmosphere, composition and texture of clay, as well as temperature affect the rate of oxidation and render estimates based on color alone problematic.

Parenthetically, one question raised by Matson should be answered. In speaking of the study of ceramic style, he refers to symmetry analysis, commenting: "This would seem to hold great possibilities for many regions when more people master the technique and when it is applied to nonlinear designs, if that is possible." The principles of symmetry analysis are just as applicable to allover as to band design. Examples and references are given in my *Symmetry of Abstract Design*.

George Brainerd's "The use of Mathematical Formulations in Archaeological Analysis" is based partly on researches which he and Robinson have reported in Vol. 16, No. 4. *American Antiquity*, the paper is more than a resumé, however. It is a stimulating discussion that merits careful reading. Those who are skeptical of statistical methods should be reassured by Brainerd's analysis of the qualifications applying to the use of mathematical techniques. Points of particular interest in Brainerd's paper are his suggestion that "mathematical studies of attribute combinations may demonstrate more finely cut cultural differentiation without the use of the intermediate concept of types . . ." and his comparison of stylistic and stratigraphic evidence in establishing sequences.

In the concluding paper, various IBM machines are described by Frederick Thieme.

The final session of the conference was devoted to a discussion of how the archaeologist can better avail himself of the potentialities of scientific methods. His advantages in working in a field that enables him to draw on many of the sciences carries its price. To know when to call on a particular specialist and how to use his services effectively, even to know what techniques are offered, requires background in the sciences and familiarity with the new methods that are continually being developed. Suggestions made by members of the conference include: short courses given by specialists for graduates and professional archaeologists, the establishment of a board of specialists to which the archaeologist would submit his material and which might hold institutes at intervals, the preparation of field manuals, more emphasis on basic principles and methods of the sci-

ences in the undergraduate curriculum. The leaning toward background training for the archaeologist, rather than more services from specialists, reflected the members' appreciation of the importance of collaboration. Fortunately the various suggestions are not alternatives from which we must choose; each has its place and each will strengthen and support the others.

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Archaeological Survey in the Lower Mississippi Alluvial Valley, 1940-1947. PHILIP PHILLIPS, JAMES A. FORD, and JAMES B. GRIFFIN. Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. XXV, 1951. Pp. 472, tables 17, figs. 113. $8.50.

In the spring of 1951, Phillips and Ford were conducting some excavations at the Jaketown site in central Mississippi and spending an occasional evening reading the page proofs on this volume. As a chance participant in one of these readings, I made a mental note of sympathy for the student who might review this work. No longer is the feeling of sympathy necessary, for there is no small vicarious thrill enjoyed through the reviewing; but the scope and magnitude of the work is large. The psychological and personal circumstances under which the work was prepared is a rare accomplishment and an object lesson for the student of American archaeology. Among the authors are two of the more forceful personalities in the profession and the presence of the third as a catalyst rather than a moderator makes this a stimulating contribution to the literature. One must wonder how difficulties and judgments were resolved — it was not always as Griffin has said of such situations, "the stronger personality prevails" — rather, both sides (or several sides) of contending points are presented.

There are several areas in North America in which there is so great an intensity and complexity of archaeological remains that one assumes a culture climax. Portions of the lower Mississippi River constitute such and it is here that the middle Mississippi culture is or was thought to have developed. Despite the wealth of attractive archaeological remains, the very nature of their large size and extensiveness deterred archaeologists from undertaking a thorough investigation of the region. The present volume represents the published report of the first step in a long-range program devoted to a more accurate delineation of the archaeological manifestations represented in one portion of the valley.

There is a certain quality to the style of this volume which may hardly be copied by many others. It has a simple straight-forward narrative pattern that makes for easy nonpedantic reading. The *Preface* states the authorship of the various chapters "for the purpose of fixing ultimate responsibility," but all things considered, there is a remarkable equanimity even to the conclusions.

The Lower Mississippi Archaeological Survey is the joint endeavor of Peabody Museum of Harvard, the American Museum of Natural History, and the Museum of Anthropology, University of Michigan. The initial purpose of the survey was to determine the nature of the antecedents of the middle Mississippi culture, but one of the most definite conclusions reached was that the origin of middle Mississippi was somewhere outside of the survey area; just where is still another problem. The tome represents only a partial reporting of the information that is expected to come from the area, the authors being insistent on the point that this is a progress report. The wealth of material in the form of organized information stems from only seven months total field work, a good reflection of the total amount of information and archaeological remains waiting still unstudied.

The survey area was originally taken as the alluviated valley of the Mississippi River between Cairo, Illinois, and Vicksburg, Mississippi, but it included the flood plains of tributaries, such as the valleys of the this territory could not be realized but it is obvious that a reasonable sampling was made. This alluvial region is near 350 miles north to south and about 100 wide. It is the great basin or series of basins resulting from the meandering of the Mississippi and/or the Ohio, for the Ohio flowed southward to join the Mississippi at Vicksburg at times less than three thousand years ago. In this vast stretch of flat land modern man has wrested a fabulous living, but so did primitive men in developing the high order of cultural complexity represented by the middle Mississippi culture. The wide cotton fields of today were practically created by the removal of cane brakes and swamp lands, and probably the "Old Fields" of ancients were so made also, for obviously prehistoric men lived in great numbers in the Valley. Indian and modern habitations are almost exclusively on the natural levees, those regions of high ground directly bordering the various streams, high ground that is built up through the process of the annual flood waters dropping their loads of silt nearest to the stream. Because of these and many other facts, a most thorough schooling in the geology and geography of the area is mandatory. In fact, every swag and swale of the surface of the ground is awesomely significant, and a field archaeologist finds that a constant awareness of the geography is inescapable. An opening section of the volume treats of the *Geographic Setting* in a sympathetic way that makes it serve as the stage upon which many future studies may be directed as well as this one. Phillips, who prepared this chapter, draws freely upon the intensive studies of Dr. Harold N. Fisk as reported in his monograph for the Mississippi River Commission, *Geological Investigation of the Alluvial Valley of the Lower Mississippi River.*

There are a number of places in the body of the manuscript where bits of archaeological philosophy creep in that must be thoroughly digested to appreciate adequately the position of the authors. An example is the chapter on the classification of pottery, which was

originally written by Ford and later revised by Phillips and Griffin. Two essential conceptual statements are included herein, namely, that of "type" in ceramics or in archaeological investigations for that matter, and of "series" in pottery. It might be supposed that there is a large measure of agreement among eastern archaeologists at least about the definition of a pottery type, but attendance at any small conference will show the fallacy of such a belief. This section is of no small import in clearly setting forth the idea that the pottery type describer is merely defining a laboratory tool, an abstract, and not a bit of history. Griffin has named and described or redescribed some already-named pottery types that occur in the area or are related to the area. This is the "meat" of the report, for some 350,000 sherds went into the mill for analysis and description. A criticism that might be leveled at the report but can be easily brushed aside by the authors is, that this top-heavy preoccupation with sherds will give a distorted view of the sequences; however, there is very little other than sherds on most of these sites. If there ever were large amounts of flint materials, etc., they have long since been "safely removed to the collectors' shelves." The lower Mississippi has long been a collectors' mecca and the shallow burials have long ago been plowed out by the intensive agriculture of recent years.

One of the most revealing sections was prepared by Griffin on the *Distribution of Some Mississippi Vessel Shapes and Features*. The heavy going has often been relieved by a light touch here and there as exemplified by the discussion on teapot shapes. These essential shapes and features are so much a part of what is traditionally thought of as the heart of middle Mississippi culture that a delineation of their distribution is tantamount to an understanding of the limits of the distribution of the middle Mississippi culture type. This critical analysis leaves but little doubt that "there was no single center for this Mississippi climax development."

When among other things it became apparent to these investigators that the antecedents of middle Mississippi culture were not going to appear as a single "nuclear" culture in the geographic center of the area, the emphasis of the study shifted to a determination of the relationship between middle Mississippi and the preceding Hopewell-Marksville. Since this relationship was most apparent in the pottery, particular care was exercised in stating the position of the authors with regard to treatment of the pottery collections. Ford is responsible for the section on *Seriation Analysis of Pottery Collections* and it is here that more departures of opinion might be found: all are agreed that a basic assumption of the seriation technique is that some cultural continuity exists; Phillips and Griffin think that cultural discontinuity is hidden or obscured by the process. However, all agreed at the time of publication that there was no evidence of any kind that breaks in the record did exist. In the ensuing section on *Stratigraphy*, Phillips utilizes the results of the seriation studies as a frame for the stratigraphic results. As may be expected, these results were not always identical, but rather than try to make the seriational data conform to the stratigraphic or vice versa, the discrepancies were left alone and explained as well as possible. It is not at present possible to judge whether seriation or a strata cut gives the more correct picture of the cultural sequence of any individual site.

One of the respects in which the authors anticipate criticism is their failure to organize the whole mass of accumulated data into discrete cultural entities (foci, or whatever). This they do not think is possible with any degree of accuracy since the present study is based on pottery analysis alone. The frame of reference used throughout is derived solely from the seriational study. It has already become apparent that the sequence is only valid within the limits of the survey scope, let alone the area. Further excavations at Jaketown and at Holly Bluff in Mississippi seem to demand the introduction of additional typological periods. As Ford has several times pointed out, what is recognized at a given time as the typological configuration for a certain period is an historical accident of excavation. Its chronological position and internal composition is subject to any number of changes.

A description of the composition of the sites completes the presentation of factual material, but another lengthy section is devoted to a controversial border-line subject, *Identification of Sites from Documentary Sources*. This section will certainly be unsatisfying to many, for again Phillips simply could not come to any definite answers about the location of sites, especially those mentioned in the various De Soto chronicles. Despite this fact, it was certainly made evident that some of the presently-accepted locations of the De Soto-mentioned villages within the survey area could not be held as valid.* At the later time of the French occupation of much of the lower valley, maps and descriptions are of greater accuracy, but here too great circumspection was demanded. That the great difference in ethnic composition indicated by the Spanish accounts and then later the French, was because of the depredations of the Chickasaw during that intervening period, is a hypothesis given weight and made impressive by Phillips' correlation of documentary and archaeological data.

Any reviewer who feels that his primary job is to point out the shortcomings of a paper would be dismayed to find that the authors of this one have forestalled him. In the *Summary and Conclusions*, the position of the three authors is more explicitly stated, but the essence of this section is the construction of a reasonable lower Mississippi Valley chronology as it pertains to the new internal evidence of the Survey and the relationship with neighboring areas. The order of cultural succession has not been altered except to indicate that the cultural history of Eastern North America has not been a continuum with two climactic peaks, namely Hopewell and Mississippi, but rather two independent though overlapping developments. The earlier

* Here see Swanton's views on this matter in *American Antiquity*, Vol. 18, No. 2, pp. 156-61, 1952.

of these, Woodland (Hopewell) is most certainly to be found rooted in the Old World, but the distinctive character of its climax (Hopewell) developed indigenously. Mississippi culture, on the other hand, must have spread into the Southeast from Mesoamerica but via the Southwest and a route other than eastern Texas. Hopewell was waning while Mississippi culture was growing in strength.

Finally, the three take a last fling at unblushing guess-dating of the lower Mississippi Valley chronology. A major result of the survey had been the conviction that more time was necessary for certain periods, not only the more recent ones, but even earlier manifestations. Hence, the following dates are suggested:

Natchez	1500-1700
Plaquemine	1200-1500
Coles Creek	850-1200
Troyville	700- 850
Marksville	500- 700
Tchefuncte	0- 500

The three authors of this volume seem committed to the idea that there will be numerous adverse criticism of the work; I greatly doubt this. The major criticism will probably be that no matter how large the tome there still is not enough. Only time can reveal whether some of the pottery types are too narrow (as I believe) or too broad, and of course, the few strata cuts clearly demonstrated that more were needed. None the less, this volume will be useful to students for many years to come and it will serve others as well as its authors as the point of departure for many different kinds of problems and studies relating to Southeastern archaeology.

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Kincaid. A Prehistoric Illinois Metropolis. Fay-Cooper Cole and Robert Bell, John Bennett, Joseph Caldwell, Norman Emerson, Richard MacNeish, Kenneth Orr, Roger Willis, with Appendices by Robert E. Bell, Kenneth G. Orr, John W. Bennett, and Charles G. Wilder. University of Chicago Publications in Anthropology, Archaeological Series, 385+XV pp., 69 text figs., 32 pls., 4 appendices. University of Chicago Press, Chicago, Illinois, 1951. $7.50.

This impressive volume is a report on eight seasons of field work by the University of Chicago at the Kincaid site, a large stratified village consisting of nineteen mounds and a settlement. Kincaid is located in southern Illinois on the Ohio River near the confluence of that stream with four other important waterways, the Mississippi, Cumberland, Tennessee and Wabash. The site is significant, not only because of its large size and strategic location, but also because of the long time span represented in the occupation.

Cole, as the senior author and the integrator, has attempted to present the material in a manner intelligible to the interested layman and, at the same time, include the necessary information required by the specialist; a difficult assignment for any archaeological report, although Cole seems to have been unusually successful.

Four major chronological periods were defined: the preceramic *Faulkner*, the early middle Woodland *Baumer*, the late Woodland *Lewis*, and the middle Mississippi *Kincaid*.

The majority of the excavations, and consequently the bulk of the report, involved the Kincaid horizon, a component of the Tennessee-Cumberland aspect. On the basis of minute cultural (principally ceramic) changes, the Kincaid component was subdivided into early, middle, and late, all of which equate in time with the middle Mississippi period. The earliest evidences of this period consisted of small, scattered villages and at least one truncate mound. A major flood of the Ohio River occurred during this interval, providing a convenient stratigraphic break. Following the flood a dramatic change occurred; the small, scattered villages, typical of the earliest Mississippi occupation at Kincaid, were replaced by a great ceremonial center consisting of several large truncate pyramids.

Kincaid houses were "wattle and daub" structures, probably with a domed roof. In early Kincaid they were rectangular in outline, with either single or double wall trenches and open corners. While the early style of house persisted into late Kincaid, through time the houses tended to become nearly square and with single but larger wall trenches and one or more closed corners. Associated ceramics are shell tempered. For purposes of statistical analysis, these were classified into a unique series of wares and types. Unfortunately, only sporadic attempts were made to correlate this Kincaid typology with that generally employed in adjacent areas. According to the results of an analysis by Orr, from early to late in the Kincaid horizon the general tendency was for vessels to become more coarse, lighter in color, with less use of negative painting, and an increase in the percentage of plates, diminutive forms, and lug handles.

Through intrusive sherds, the subdivisions of the Kincaid horizon were correlated with adjacent areas. Late Kincaid was believed to be contemporary with Oneota (Orr focus — upper Mississippi), Trappist (Cahokia), Fulton aspect (Caddo area), and Moundville (southern Mississippi Valley). Middle Kincaid was also correlated with Oneota and Moundville, together with Placquemine (lower Mississippi), and Gordon (Tennessee). Early Kincaid was temporally equated with Old Village (Cahokia), Hiwassee Island (Tennessee), and late Coles Creek (lower Mississippi Valley). The validity of certain of these correlations will be discussed later in this review. On the basis of a technically impressive tree-ring study by Bell (Appendix I), late Kincaid was dated from 1598-1613+, middle Kincaid from 1523-1598, and early Kincaid at pre-1523. Cole and his as-

sociates noted that the Kincaid horizon did not represent the earliest middle Mississippi nor did it extend into the historic period.

A distinct cultural break separates the middle Mississippi Kincaid materials from those of the preceding Lewis levels (late Woodland). Lewis sites were small, scattered villages consisting of rectangular houses with a framework of large posts set close together in individual holes. A "wattle and daub" siding was erected against this framework. Numerous circular, trash filled pits were found adjacent to the houses, providing segregated concentrations of Lewis materials. Pottery was "grit" tempered, the majority decorated with cord markings. It was suggested that stone cairns were employed for burials; however, the evidence was not conclusive.

Early middle Woodland (and perhaps early Woodland?) was represented in the Kincaid area by the Baumer focus. Houses of this period were square, outlined with postholes but, as in the later Lewis structures, lacking wall trenches. There were some indications that the houses may have been erected in line and close together. Fire areas were lacking, suggesting that cooking was done outside the houses. Baumer pottery was typically fabric-marked, either clay (?), sherd or limestone tempered, and usually flat based. Although Baumer vessels have been reported from Hopewell sites, it was suggested that Baumer probably just precedes developed Hopewell. The latter horizon apparently was absent from the immediate Kincaid area.

The oldest cultural division defined was the preceramic Faulkner. This horizon was not represented at Kincaid proper but was found in a nearby site stratigraphically below materials ascribed to the Baumer focus. Architectural evidence consisted of hearths, roasting, and storage pits. No dwellings were found. Projectile points were long with tapering stems or corner, side or basal notches. In addition, there were eight points which had concave bases and fluted faces, somewhat resembling the Folsom technique. Other lithic tools included grinding stones, atlatl weights and hooks (?), drills, knives, and scrapers. A comparison of these traits with other Archaic materials from Tennessee and Kentucky led MacNeish to suggest that Faulkner was a regional variation of a widespread hunting and gathering culture.

Over one-third of the report is presented in appendices. The first, by Bell, contains a discussion of tree-ring dating at the Kincaid site. Unlike the Southwest, where datable wood is fairly common, in the Kincaid area only *Juniperus virginiana* was suitable for this purpose. Consequently, it was necessary for Bell to spend several years in collecting datable specimens and assembling a master chronology. In spite of this background preparation, the results were only moderately successful since only eight specimens from Kincaid could be dated. As a result, the suggested dates (late Kincaid, 1598-1613+; middle Kincaid, 1523-1598; early Kincaid, pre-1523) cannot be considered conclusive, although they are indicative and agree with other evidence from the site.

Appendix II, by Orr, includes a statistical study of culture change during the Kincaid horizon as indicated by the relative frequencies of certain ceramic features, such as vessel forms, appendages, surface texturing and color. Previous attempts by standard methods to detect significant chronological differences in this material had been unsuccessful.

The statistical techniques were simple and straightforward. Materials from an upper and a lower section from each of four different areas were used to form a "combined sample." The frequencies of certain vessel features in the upper horizons were compared with those from the lower levels and, through the application of the "t test," the probabilities of the indicated difference occurring by chance were determined. When the probability of the differences between two proportions being due to chance was less than 1 in 100, then Orr considered the differences to be highly significant. This technique is an interesting device for detecting and demonstrating the validity of small but significant differences in apparently uniform materials.

The definition of early, middle and late Kincaid was based on this statistical analysis. Material from the combination of the four apparently arbitrarily selected lower levels was used as a basis for early Kincaid. Similarly the combined upper levels were defined as late Kincaid and middle Kincaid was the material from the bulk separating these two stratigraphic extremes. The result of Orr's analysis is an indication of the general trend in culture change at Kincaid.

It should be pointed out, however, that the majority (three out of four) of the individual samples used in the combined sample for early Kincaid were not taken from areas where the earliest Mississippi materials were recovered. Thus the early Kincaid sample contained not only material from what may have been an early Mississippi occupation but also a somewhat larger sample from three levels occupied during later Mississippi times. This situation would have been of little consequence had early Kincaid not been chronologically correlated with some early Mississippi manifestations as Old Village and Hiwassee Island. The presence at the site of several intrusive sherds from early Mississippi horizons indicates that material of this period was present at Kincaid; however, the mixture of this material with later material in early Kincaid, as defined, prevents acceptance of Orr's suggested temporal correlations.

It is difficult to understand why Orr did not use the Mississippi materials found below the deposits left by the flood, which occurred during the early part of this interval, as a basis for early Kincaid. Apparently the majority of the intrusive early Mississippi sherds found at Kincaid were recovered from below these deposits. A segregation of this material from that of the later Mississippi occupation might have been highly illuminating. At least a valid comparison then could have been made with other sites where early Mississippi materials have been reported.

Appendix III, by Bennett, contains a listing of Kincaid traits under activity categories such as agricultural, hunting, political, and industrial.

Appendix IV, by Wilder, is an analysis of Kincaid textiles as indicated by impressions of fabrics and cords on pottery vessels. Because of the specialized nature of this study, the reviewer asked Irene Emery, who is currently engaged in a study of textile techniques and terminology, to comment on this section. Miss Emery's remarks are as follows:

"Unfortunately, Wilder's study is handicapped by a confusing and inadequately defined terminology. A term such as 'cloth-weave' is not defined and, although this term is a widely accepted synonym for 'plain weave,' Wilder used 'cloth-weave' at least once to describe a 'plain twined fabric.' The term 'wicker' may also be questioned. As defined in this report, wicker is a type of weave produced when the warp is unpliable, but how can the pliability or impliability of the warp be determined from an impression? A simple experiment with a plain weft-faced weave where the warp and weft are both pliable should convince the reader that the pliability of warp cannot be determined from an impression. Many other instances of conclusions based on inadequate data and confusing terminology could be cited; however, this would only serve to point out the handicap under which all textile descriptions are made in the absence of a generally accepted and consistent system of terminology."

In spite of the foregoing criticisms, the Kincaid report is a major contribution to archaeology of the Mississippi Valley area. The generally excellent illustrations, clear descriptions and coherent organization lead to interesting reading, not only for the specialist, but also the layman.

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Outline of South American Cultures. GEORGE P. MURDOCK. Behavior Science Outlines, Vol. II. Human Relations Area Files, Inc., New Haven, 1951. iv+148 pp., 25 maps.

This outline provides a summary classification of South American Indian cultures into 216 relatively small groups, each group consisting of from one to twelve or more tribes. For convenience of reference, these primary groups are listed in 23 larger units, some corresponding roughly to present countries (e.g., Colombia, Ecuador, Peru) and others to geographical areas (e.g., Patagonia, Amazonia). The chief purpose of the classification is to provide convenient filing categories for data to be incorporated in the Human Relations Area Files.

For each primary group a one paragraph summary of the culture is provided, and the summaries are documented by one or more bibliographical references. Murdock relies extensively but not exclusively on the coverage in the *Handbook of South American Indians*. In general, when a tribe is reasonably well known it rates a primary unit to itself; the tribes grouped together in the classification tend to be ones about which there is little information available.

The primary grouping system is perfectly satisfactory as a filing device but it provides a basis of dubious value for a further simplification in terms of culture areas. The fact that most well known cultures are given separate listing reflects a striking characteristic of South American cultures in general; namely that each one tends to be markedly different from its neighbors. Many of the tribes grouped together will need to be sorted and listed separately in a system of this type when more is known about them, as Murdock himself predicts for the Fulnió group (p. 77).

Murdock still has great faith in the classificatory value of the culture area concept, however, and near the end of his *Outline* he provides a schematic grouping of the primary cultural units into culture areas (pp. 133-136). The culture areas are discussed in further detail but without additional documentation in an article by Murdock which appeared at about the same time: "South American Culture Areas," *Southwestern Journal of Anthropology*, Vol. 7, No. 4, Winter, 1951, pp. 415-436. In this article, Murdock states that his culture areas were set up by comparing the primary cultural units on the basis of "a schedule . . . of a selected number of important traits and complexes upon which comparable information is fairly widely available" (p. 415). The schedule is not reproduced; Murdock simply lists nine major types of information covered by it. From the tabulation "emerged" 24 culture areas somewhat different from Steward's.

This reviewer regards the culture-area concept itself as indefensible on theoretical grounds and as an inevitable source of distortion in presenting specific cultural data. Among the various existing culture-area classifications for South America, the only basis for choice is which type of distortion one prefers. Murdock's classification rests on fewer evolutionary assumptions than Steward's, but a sample check on his Caquetá area, run at my suggestion by Dwight T. Wallace, suggests that it is somewhat inferior to Steward's arrangement as a reflection of cultural similarities and differences.

Murdock's areas are far from being comparable units. The Caquetá area involves some real internal comparison, for it includes 4 tribes which have been reasonably well described (Cubeo, Witoto, Yagua and Tucuna); in the Chilean area there is only one tribe (Mapuche Araucanian) on which we have satisfactory data for comparison. The Montaña area is a pious hope; information on all the tribes is grossly inadequate. The Paraguayan area is set up as a catchall for tribes that do not fit well into the neighboring areas; it has no cultural unity at all. Murdock criticizes Steward for depending on negative criteria, but he himself uses them prominently in setting up his Savanna area.

Finally, it may be noted that Murdock gives a list (*Outline*, pp. 137-139) of 60 South American cultures which he regards as a representative sample of the range of cultural variation and the relative incidence of dif-

ferent culture types in the continent; 52 of these are Indian cultures, the rest largely of European or African origin. The idea is an interesting one, but the choice cannot be other than impressionistic in our present state of knowledge and such a sample would not add greatly to the reliability of the results of any statistical study in which it was used. It may have some value in suggesting interesting tribes for treatment in an area survey course.

A seven-page index of tribal names at the end of the *Outline* is one of its most useful features. The maps are highly generalized, but adequate to their purpose.

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Chimu. Eine altindianische Hochkultur. GERDT KUTSCHER. Verlag Gebr. Mann. Berlin 1950. 112 pp., 80 pls., 77 text illus. 4°.

Lucid surveys of ancient American civilizations for nonspecialists are few; but as regards one of the most striking of these civilizations, that of Chimu on the north coast of Peru, Gerdt Kutscher has now remedied this lack. In a well printed, elegant volume with excellent plates and illustrations, he has described the Chimu civilization with remarkable erudition, inspiration and enthusiasm. The text illustrations with their detailed explanations and analyses give the narration added lucidity. At times his interpretations may appear rather too imaginative, but the analyses undoubtedly arouse interest and appeal to the reader's imagination. An added advantage to students is the detailed register of plates, giving particulars of size and locality, explanations, etc.

Through rich grave-finds Chimu's civilization can be studied in detail, and recent stratigraphic excavations are beginning to establish a reliable chronology. Ceramics constitute the aesthetically foremost element and are most susceptible to changes in cultural life. The pottery — shaped like human figures or heads, animals, buildings, temples, and demons of diverse types — introduces us to a singularly vivid and real world of warriors and lords, sick and maimed, sleeping drunkards, monstrous demons and everyday situations. The effigies of nameless rulers are monumental in spite of their small size. Globular flat-bottomed vessels are decorated with paintings and, like the others, commonly have a hollow, stirrup-like handle with a vertical spout at the top, the vessel's only opening. The technique is brilliant, and both the sculptural and painted decorations bear witness of dexterous skill and lively powers of observation, where ambition and ability have combined to produce masterpieces. The 80 plates of the volume reproduce some representative specimens of Chimu art, though they cannot equal Heinrich Ubbelohde-Doering's consummate photography in his book "Auf den Konigsstrassen der Inka" (Berlin 1941).

The paintings show expressive, graceful, lively scenes, drawn with fine russet lines against a cream background. If the molded vessels may be said to represent the subjects, the painted ones depict them in action — hunting, fishing, fighting, and performing ritual acts. There is no shading or perspective in the drawings; and the life-like figures are therefore altogether dependent on contours, dress and ornaments. Kutscher boldly tries to interpret the purpose of the scenes, but as chroniclers were brief and the thread between past and present consequently has broken, it is a delicate task to bolster fact with fancy. We actually see unknown persons perform unknown ritual acts, and it is hazardous to assume that what we think we see is what the artist intended to depict. We are ever confronted by the same problem: the relations between humans and demons, with a maze of strange and unknown ideas, conceptions and emotions. The author's studies and inspiration can teach us a great deal, however. He has, incidentally, treated this subject in considerable detail in a paper "Iconographic Studies as an Aid in the Reconstruction of Early Chimu Civilization." (Transactions of the New York Academy of Sciences, Ser. II, Vol. 12, No. 6, pp. 194-203, April 1950.)

Buildings were of sun-dried brick, adobe, and have been seriously damaged by the tooth of time as well as the spades of treasure-seekers. Kutscher gives details of some of the imposing ancient ruins, such as the enormous "Huaca del Sol" at Moche, probably a pilgrimage center like Pachacamac on the central coast. It has a step-sided platform, 228x136 meters and 18 m. high, with a step-sided pyramid on it, 103 m. square and 23 m. high. Chanchan near Trujillo was formerly a capital city. Ruins of palaces, temples, streets, courtyards, gardens, water-reservoirs and so on cover many square miles. Far to the south a defense wall stretched from the mountains to the sea with the fortress Paramonga as an outpost. This fortress has a kind of bastion, and Erland Nordenskiold even claimed that it was from Paramonga that European bastion builders first had the idea.

Servants of the Holy Church followed close upon the Conquistadores. Christian zeal, and at times genuine interest, led them to penetrate into Indian conceptions and ideas, with intent to influence the idolaters through their accustomed channels of thought. We consequently have rich fountains of information regarding the Incas, but few chroniclers have had anything to report about the coastal country. Kutscher has, however, in an appendix attached excerpts from the most important of available descriptions. Thus, through Miguel Cabello de Balboa, we learn of Naymlap, a powerful leader who once came with a large retinue from far away to Lambayeque on balsa-wood rafts. Possibly this may be a dim memory of contacts with Central America. Judging by our present knowledge, however, it would seem more probable that the coastal regions of Central America and Mexico were culturally influenced from the south. Fifty years later, in 1638, Antonio del la Calancha describes the Pacasmayo valley and its history, and re-

lates quite a deal concerning the religion, administration, laws, manners, and customs.

The Swedish archaeologist Hjalmar Stolpe, founder of the Ethnographical Museum of Sweden, Stockholm, examined graves in Ancon as early as in 1884, but his material has unfortunately not been published. It is striking how simple these grave-finds were; and one realizes that the ceramics we now admire are not at all representative of everyday wares but of the best that art and handicraft could produce. The rest — the plain, everyday articles — were things the huaqueros had not bothered to take.

The first to attempt to systematize the ancient Peruvian civilizations was the German archaeologist Max Uhle. Much later investigations were begun on a large scale by Peruvian scholars, especially Julio Tello and R. Larco Hoyle, and by North American archaeologists such as Wendell C. Bennett, Junius B. Bird, A. L. Kroeber, William Duncan Strong, Gordon R. Willey, and others. Kutscher's summary of the sequence of cultures does not altogether agree with the latest chronological charts compiled in North America.

Kutscher gives a short description of the country and its natural features, of imposing irrigation systems and fertilized fields; but unfortunately he has not included any pictures of ruins or landscapes. He also describes foods and luxuries such as pleasantly intoxicating chicha, tobacco which was snuffed, and coca chewed with lime. People were richly dressed, and men not only wore ornaments on nose and ears, but were also painted and tattooed. Facial hair was removed with small metal tweezers. A sparse, black, lank beard on some effigy vessels has therefore aroused considerable curiosity and given rise to naive and fanciful speculations about lordly persons from far away.

One would wish that the author had devoted more space to the technique of ceramics and metallurgy, and likewise to the sections on trade, communications, political and social conditions, justice, the care of children, burial customs, astronomy, and astrology. His omission of quipus, knot records, is regrettable. The importance of these for our appraisal of ancient Peruvian astrology, astronomy, and mathematics was established by Erland Nordenskiold.

The painted ceramics often depict ritual proceedings such as races, for instance. The runners chase each other in a spiral around the vessel, with bodies bent forward and adequate strides. In one hand they often carry a bag, which Kutscher has filled with beans. On one vessel twenty runners are racing for the goal; and those in the rear are drawn smaller and smaller, until the last of them appear as beans with human limbs. I think Kutscher is too categorical in interpreting this scene as a fertility rite designed to promote the bean harvest — one can imagine other possible explanations.

Gods and demons are depicted as fantastic beings, combining limbs and bodies of humans and animals and even inanimate objects. Every detail is realistic. These mixtures make the gods and demons strange, inhuman, and mysterious in appearance. Inanimate things can also assume fiendish guise. The helmet and shield demons have human heads and limbs, the club field likens a snake, and so on. Kutscher cleverly remarks that these representations would fit well into Hieronymus Bosch's bizarre and fantastic dream-world.

Poring over Kutscher's beautiful, interesting, and comprehensive volume is like making excursions to a singularly rich, strange, and fascinating ancient world. One must sincerely congratulate the author, and we owe our thanks to the publishers, who in these times of crass materialism have taken the risk of publishing a volume which, unfortunately, turns to a limited public. A distinguished old tradition has thus been carried on. This volume is a healthy bud on the proud tree of German Americanistics, which has survived the heaviest of storms; and it constitutes the promise of a bright future in this field of science.

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Freshwater Fish and Fishing in Native North America. Erhard Rostland. University of California Publications in Geography, Vol. 9. 313 pp., 1 fig., 4 tables, 47 maps. University of California Press, Berkeley and Los Angeles, 1952. $3.50 (paper bound).

This monograph is a very complete account of freshwater fish and fishing in native North America which should be of great value and interest to ichthyologists, geographers and anthropologists. It consists of fourteen chapters, a summary of references, an excellent bibliography of 33 pages, a map section, and an index, and is divided into two major parts — Part One: The Fish Resource, and Part Two: Aboriginal Fishery and Fishing Methods. Part One includes chapters on the Food Value of Freshwater Fishes, Principal Species in the Fish Resource and, The Quantitative Aspect of the Fish Resource: Productivity of Fresh Waters.

In the chapter summarizing the principal species, the author has had the advice of Professor Carl L. Hubbs of Scripps Institution of Oceanography and Dr. Robert R. Miller of the University of Michigan, as well as other authorities on particular points of distributions and identifications of species. A section is devoted to each major fish family and in the map section of the monograph there are one or more maps showing the distribution of the genus and species. The ichthyological references to the species are given in the legend of the maps. It might have been more useful to have the distribution map of the species with the descriptive notes, but having all the maps in a group also has its advantages.

Chapter III on the Quantitative Aspect of the Fish Resource is of interest. Tables are presented showing possible annual production of fish in inland waters and estimated sustained annual yield of Freshwater and anadromous fishes. In a number of regions where there was a good potential yield it was not used extensively because of the lack of proper equipment, attitudes toward

the use of fish for food, and to the time and effort given to fishing. Chapter IV is a resume of the Fish Resource by Regions.

Part Two: Aboriginal Fishery and Fishing Methods consists of a series of discussions of various fishing equipment and techniques, the preservation of fish, and summaries of the utilization of the fish resource and culture-historical inferences. There are chapters on Fish Nets, Weirs and Traps, Fish Spears, Fishhooks, Fish Poisoning, and Miscellaneous Minor Fishing Methods. Regional studies of net types and techniques offer many possibilities of significant distributions and indicate routes and relationships between areas. In the section on fish-hooks there is material which suggests further study. The composite hooks reported on by Jochelson (Archaeological Investigations in the Aleutian Islands. Carnegie Institution of Washington Publication No. 367. Washington, 1925) from the Aleutians are very close in type to composite fishhooks of the stone age in the circumpolar zone of Europe from west Norway into Russia. A recent book by J. G. D. Clark (Prehistoric Europe The Economic Basis. Methuen & Co. London, 1952) contains some excellent material on fishhooks in Europe. A typical bone hook of the archaeological periods in the area east of the Rocky Mountains in North America is the same as a type found in inland fishing areas of northern and central Europe. For additional notes on fishhooks in North America there is an article by Biren Bonnerjea (Fish Hooks in North America. Journal of the India Anthropological Institute I: Calcutta, 1938) not utilized by Rostlund.

The halibut hook of the Northwest Coast given as one type should be considered as one of two subtypes of a major form. The one illustrated by Rostlund as being typical is so only for the northern half of the area while the groups from the Haida south to the Puyallup, Makah, and Quileute used a hook of the same general type but instead of a straight shank and a straight barb arm it was made of a piece of wood bent to a C-shape. The type is illustrated by Boas (Ethnology of the Kwakiutl, BAE-AR: 35. Washington, 1921) for the Kwakiutl and for other groups in the ethnographic reports on the groups of the region. Barnett (Gulf of Georgia Salish. University of California Anthro. Rec. 1:5. Berkeley. 1939) and Drucker (Northwest Coast. University of California. Anthro. Rec. 6:3. Berkeley. 1950) present data showing the distribution of these subtypes.

Rostlund has a section of References to Aboriginal Fishing Methods which is of use for future work. Detailed work on the material from archaeological horizons might indicate more data on the problems of distributions and of the patterns of native American culture history.

The map section is well done and gives a quick view of the data presented in the text of the monograph. The data gives the impression of a number of major routes of diffusion. One along the west coast of North America from Alaska to the south, another across the Arctic with a branch southward in the Mackenzie drainage and a possible branch into northern United States, and one toward northeast Canada and south into the northeast Atlantic states of the United States. From the south there seems to be a route from western Mexico north and from Florida into the south Atlantic states. There are some traits which show Asiatic parallels or perhaps circumpolar connections. Fish poisoning seems to have southern origins. There is still much to be learned from detailed studies of the fishing equipment and techniques of the New World and the Pacific region generally. Archaeologists should be careful to note material which may be a part of fishing activities. Rostlund has compiled a monograph which should serve as a starting point for others interested in ethnological and archaeological distributions, the diffusion of traits and trait complexes, and the broader patterns of culture areas in native North America.

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A Summary of Tree-Ring Dates from some Southwestern Archaeological Sites. TERAH L. SMILEY. University of Arizona Bulletin, Vol. 22, No. 4; Laboratory of Tree-Ring Research Bulletin No. 5. Tucson, 1951. 32 pp., 2 figs. $0.30.

This is a long-awaited tabulation of the dates of the archaeological sites of the Southwest, specifically those dated or checked by members of the Laboratory of Tree-Ring Research staff. Preceding a long and detailed tabulation of sites, dates, and concentration of dates, there is a foreword by A. E. Douglass and several pages of text that purport to be instructions for interpreting the tables. In actuality, Mr. Smiley has drawn into the text some matters of basic interest to archaeologists who work with dated sequences of any kind. He points out that the dendrochronologist dates the wood, but that the meaning of the date is the responsibility of the archaeologist. If the archaeologist is unacquainted with some of the problems of ranges of dates, concentrations of dates, and other uncertainties connected wtih technical dating of samples, he is likely to make assumptions that employ only a part of the information at his disposal. The range of dated wood samples from four Hopi villages, for example, would indicate no occupation after the 18th century even though these villages have been occupied without interruption to the present day. It would be to the advantage of anyone who intends to employ tree-ring dates to consult not only the table itself, but the careful analysis which summarizes 561 specimens from 365 individual sites.

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Neolit i Bronzovyy Vek Pribaikaliya. Istoriko-arkheologicheskoye Issledovaniye (The Neolithic and Bronze Ages of the Baikal Area. An Historical-Archeological Study). Parts I and II. A. P. Okladnikov. Materialy i Issledovaniya po Arkheologii SSSR (Materials and Researches on the Archeology of the USSR), vol. 18. Moscow-Leningrad, 1950. Pp. 411, 128 figs., 3 maps, 6 tables.

The Baikal area is of focal interest both as an exceptentionally well-known archaeological province of Siberia and as one of the points from which the matter of prehistoric Asiatic-American contacts must be examined. Although this latter aspect of Siberian prehistory cannot be said to be in the foreground of present-day Soviet archaeological consciousness, the author of this monograph is aware of it and, in several instances, refers to North American parallels.

A rather well-dated and reasonably complete perspective extending from late glacial times to the present is available for the region including the shores of Lake Baikal, the Angara valley, the upper reaches of the Lena and the lower Selenga. The Baikal sequence can thus be viewed both as a reference point in eastern Siberian culture history and, as it were, as a sample core from the formation in which lie the roots of native American culture.

The earlier portion of this sequence, from Paleolithic times to the threshhold of the bronze age (*ca.* 1700 B.C.) is fully presented to us for the first time in Dr. Okladnikov's ambitious summation. Much of the author's field work has been in eastern Siberia, in Baikalia proper and in Trans-Baikalia. Dr. Okladnikov is also to be credited with a survey of the Amur valley (1935), an extensive survey of the Lena valley to its Arctic outlet (1940-45) and with pioneer tests in the Kolyma and Khatanga valleys. If one adds to this record his work on early sites in Turkmenia and his direction of the by now famous Teshik Tash excavations in Uzbekistan, it is clear that Okladnikov is to be ranked among the most active and prominent of contemporary Soviet archaeologists.

Although *The Neolithic and Bronze Ages of the Baikal Area* offers a rewardingly complete picture of the segment of prehistory it deals with, it must be noted that some lacunae exist in the presentation of the data. Field methods are not mentioned, and statistical data are not full. The work, like many published here and abroad, evidences a selection of descriptive data which prevents it from measuring up to such reports as Rainey and Larsen's *Ipiutak and the Arctic Whale Hunting Culture* or Willey's *Archeology of the Florida Gulf Coast*. Yet it is highly informative and, in particular, is well supplied with excellent illustrations.

It must also be noted that Dr. Okladnikov's monograph is no exception to the rule that requires every work published in the USSR to contain its share of quotations of Stalin, Lenin and Marx and, lately, to manifest an intense nationalism in its discussion of Russian and foreign references. These faults are perhaps best taken for granted. The problem for the reader boils down to determining which conclusions of the author are dictated to him by political pressure and which are products of authentic and original research.

In the work under review, for example, a rather inane argument is assumed to "prove" that matriarchy was the prevalent social structure in one of the periods examined, and can be dismissed as a reflection of the official Soviet socio-political credo.

Although actual field data are absent, over sixty pages of this volume are devoted to an examination of the methods used in arriving at the Baikal chronological sequence. The problem is examined under three headings: (1) relative chronology of grave assemblages; (2) the correlation of the grave sequence with stratigraphic-occupational evidence; and (3) absolute chronology in the light of comparative data.

The first aspect of the chronological question is treated on the basis of Angara grave material. In the region as a whole, it may be noted, grave material appears to be considerably more abundant and rewarding than occupational refuse. In turn, the Angara valley seems to be the richer and better known area and, hence, Angara graves are used to build a framework to which other finds in the province are related. The final scheme serves to date some 180-odd burials.

The Glaskovo (eneolithic), Kitoi and Serovo complexes are thus defined by means of a dozen or so diagnostic artifacts recurring in most or all of 74, 41 and 38 graves respectively. Less well-represented complexes such as the Isakovo and Shivera (full-blown bronze) are shown to be internally consistent and distinctive, although known only from 12 burials each. Finally, the Khin' stage, known from only two burials, is clearly distinctive and transitional from the local epipaleolithic.

Having isolated these distinctive groups, their placement in a sequence is achieved by what might be termed presence-and-absence seriation. At the upper end of the sequence belong the Glaskovo and Shivera stages, representing, respectively, the incipient and full bronze ages. At its lower end is placed the mesolithic Khin' stage. Finally, the appearance, carry-over and disappearance of traits in Isakovo, Serovo and Kitoi, if tied in with the known beginning and end points of the scale, give clear evidence of the succession of these stages in the order above.

Only two refuse deposits yielded material adequate for time-placement, although ten were located. The first of these is the well-known Ulan Khada occupational site, on the northwestern shore of Baikal lake, excavated by Petri in the beginning of this century. The eleven-level site confirms the grave chronology, yielding a succession of late Serovian (XI-IX), Kitoian (VIII-III) and Glaskovian (II-I) deposits. Contrary to previous suppositions, this site is far from representing the earliest neolithic manifestations of Baikalia. Another site (Shestakovo, on the Ilim river) yields a Serovo occupation below a Glaskovo stratum.

Absolute chronology is reasonably secure only for the later stages. Shivera ties in clearly with the widespread Karasuk culture of southern Siberia, a Sino-Siberian horizon apparently filiated to early dynastic Chinese (Shang) culture. In the Baikal region, this cultural stream is assumed to have manifested itself *ca.* 1300 B.C., a date intermediate between that of the prototypical Chinese manifestation and that of the Karasuk proper of the Minusinsk Basin, dated currently at *ca.* 1000 B.C.

Glaskovo offers parallels to Yang-Shao (2200-1700 B.C.): nephrite bracelets, nephrite adzes and bead types. Glaskovian metal knife-blades parallel closely those commonly occuring in the Andronovo culture of the Minusinsk region, a pre-Karasuk horizon dated from 1500 to 1000 B.C. Klaskovo is hence dated by Okladnikov from *ca.* 1700 to 1300 B.C. Kitoi is thus placed before 1700. Its proposed dating of 2500-1700 appears reasonable, although the proof adduced is not always convincing or even relevant, and involves comparisons with manifestations in European Russia and Scandinavia. Some of these, however, seem striking enough to be considered, and some parallels with early and middle Yang-Shao do not seem so controversial.

This leaves two and a half millennia for the three earlier stages, assuming the local epipaleolithic to have lasted until *ca.* 5000 B.C. This latter guess-date seems adequate, on the basis of geological and faunal considerations. 500 years are allotted to Serovo and a thousand apiece are given to Isakovo and Khin'. Speculative as they are, these estimates appear plausible, especially if one goes along with the author in accepting the complete and continuous nature of the post-paleolithic developmental sequence in the area as it is known now.

Part II of the monograph is devoted to characterizing the Baikal cultures, from Khin' to Kitoi inclusive. Some twenty pages contain a discussion of the origins of the Baikalian neolithic. Continuities between the Mal'ta-Buret' Upper Paleolithic complex (the earliest in Siberia and correlated with the last glaciation) and the later Yeniseyan epipaleolithic are emphasized. Okladnikov views the latter as an adaptation of the former to a taiga environment, with the consequent development of a woodworking macrolithic quartzite industry alongside the older flint tradition of smaller implements.

Among the epipaleolithic traits which constitute the heritage of the later cultures in the region might be mentioned the preparation of prismatic cores and the concomitant lamellar flake and side-blade habits.

The Khin' stage (*ca.* 5000 to 4000 B.C.) is marked by the appearance of the bow and arrow, the latter tipped with a partially retouched shouldered point not unlike the Swiderian of eastern Europe. Okladnikov notes that points of a similar type characterize the mesolithic (Daurian) culture of Trans-Baikalia and the earliest neolithic cultures in other parts of Eurasia (e.g. the Kel'teminar in Turkestan). The scanty Khin' inventory also includes some bayonet-like slate points, hexagonal in cross section, and some plain bone points, of a flattened semi-lunar cross section.

The Isakovo stage (*ca.* 4000 to 3000 B.C.) sees the appearance of lump-modelled, grit-tempered, poorly fired net-impressed pottery. The vessel form is conoidal and decoration is confined to widely spaced punctation below the lip. Retouched prismatic side-blades, asymmetrical triangular knives and triangular points with asymmetric tangs are characteristic flint artifacts. Half-ground adzes, trapezoidal or subtriangular in cross section and asymmetrical in profile, and long bone points with retouched side-blades are also present.

The Serovo stage (*ca.* 3000-2500 B.C.) is remarkable for the appearance (and the disappearance after it) of the reinforced bow with bone backing. The pottery resembles the Isakovian, but tends more toward a subglobular form, is thinner, occasionally sand-tempered, and is decorated by bosses and dentate stamping. Net-impression is more often smoothed over. Arrow points are typically stemmed. Ripple-flaked lanceolate points (of the type illustrated by Macgowan in *Early Man in the New World*, p. 214) are typical and disappear later. Adzes become more regular in form, often triangular, rectangular or plano-concave in cross section, exhibiting frequently a pronounced "shoelast" profile and a rectangular outline. Pressure flaking and indirect percussion tools were also found in graves of this period. Barbed harpoons with line guards are present. Perforated stone fish-effigies, which find counterparts in Red Paint graves, in middle Jomon in Japan, and among wooden and bone decoys used by the Tungus, Chukchi and Algonquians, appear in this stage and persist later.

The Kitoi stage (*ca.* 2500-1700 B.C.), the last treated in this volume, sees the appearance of nephrite as material for adzes and knives. New types of stamping appear in the pottery (dragged and jabbed paddle, angular-edge paddle, semi-lunar impression), together with rim castellation. The chipping technique becomes cruder, and large oval scrapers of quartzite and argillite appear. Stemmed points are replaced by triangular forms with straight or convex bases or asymmetric tangs. Adzes become thinner and flatter in profile and cross section. Noteworthy are grooved arrow-shaft smoothers of the type familiar to American Plains and Plateau archaeologists. Harpoon points similar to those of the preceding period have perforated line-guards. Moose antler picks and moose scapula hoes (Okladnikov refers in this connection to the scapula hoe of the American Plains) are represented. The major feature about this period, however, seems to be a radical and sudden shift from a predominantly hunting to a predominantly fishing subsistence, as indicated by a tremendous number of fishhooks (of the composite type) in the graves.

Unfortunately, the metal-using periods are treated in a volume which does not seem yet to have appeared, at least in this country. A description of the Glaskovian period is especially to be anticipated since we know from other statements by Okladnikov that in it traits most characteristic of the modern Evenki (Tungus) make their appearance. In particular, such traits as the Tungus "apron," construed by Shirokogoroff as indica-

ive of recent southern origin for the Tungus, are identified archaeologically as dating from the first part of the second millennium B.C.

Since the forthcoming second portion of Okladnikov's work does not purport to deal with iron age developments, it might be added, for the information of the reader, that the more recent portion of the Baikal sequence does not seem as yet to be as well illumined archaeologically as the older periods. The precise manner in which Turkic (Kurumchian) culture of the first millennium A.D. in the Baika area is integrated into the historic Tungus background, in particular, has not been made clear, at least in print. On the whole, it would seem that research in Baikalia has not proceeded along direct-historical lines. Whereas cultural parallels between Glaskovian and the ethnological Tungus (supplemented, as we understand, by somatological data) probably constitute the most solid data to date on Tungus origins, well-documented recent prehistoric and protohistoric archaeology would still be the only basis for truly reliable conclusions regarding Evenki "ethnogenesis," as the Russians are wont to call this type of problem.

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BOOK NOTICES

Prehistoria de America. Salvador Canals Frau. Buenos Aires, 1950. pp. 588, 118 figs., and 12 pls. 50 pesos.

This general work is criticized in reviews by John H. Rowe in the *American Anthropologist* (Vol. 53, No. 2, pp. 256-266, April-June 1951), by Juan Comas in the *Boletin Bibliografico de Anthropologia Americana* (Vol. XIII, 1950, Pt. II, pp. 63-65, Mexico, 1951), and by Jose Imbelloni in *Runa* (Vol. III, pp. 257-259, Buenos Aires, 1950) as: devoting too much space to an out-of-date summary of European prehistory; presenting an untenable rigid theory of definite successive migrations; correlating physical types one-for-one with cultures and languages; ignoring processes of culture-change; and including numerous factual errors and specific misrepresentations or misconceptions. A reply to Comas by Canals Frau in the next and current issue of the BBAA (Vol. XIV, 1951, Pt. II, pp. 46-49, Mexico, 1952) is rather unconvincing and is effectively disposed of in a counter-rebuttal by Dr. Comas, distributed as a separate pamphlet, *Consideraciones en torno a la "Prehistoria de America" de S. Canals Frau*, Mexico, 1952.

Motolinia's History of the Indians of New Spain. Translated and edited by Elizabeth Andros Foster. (*Documents and Narratives Concerning the Discovery and Conquest of New Spain*, N.S. No. 4.) The Cortes Society, Berkeley, 1950.

This is the first English translation of Fray Toribio Motolinia de Benavente, one of the original first group of 12 Franciscans to follow Cortes into Mexico. The Spanish text was published in 1858 by Icazbalceta. The book is fully reviewed by Philip W. Powell in *Miss. Valley Hist. Rev.* 38-1, June 1951, 95-96.

The Sandpaintings of the Kayenta Navaho. Leland C. Wyman. University of New Mexico Publications in Anthropology No. 7, Albuquerque, 1952.

A collection of 60 different Navaho sand-painting designs was assembled between 1906 and 1918 by the late Mrs. Louisa Wade Wetherill of Kayenta (see Frances Gillmor, *Traders to the Navajo*, University of New Mexico Press, Albuquerque, Second Edition — 1952, pp. 265, $3.50). It is one of three major collections of such reproductions actually made by Navahos, and the only one from the Marsh Pass-Monument Valley region. In this bulletin, Dr. Wyman has collated information from Mrs. Wetherill's notes and other sources of data on each Navaho chant or ceremonial involving sand-paintings.

Karok Ethnobotany. Sara M. Schenck and E. W. Gifford. Anthropological Records 13:6, pp. 377-392, University of California Press, 1952. $0.35.

The native name (lacking only in few cases) and use, if any, are given for each of 239 specifically identified plants, collected in Karok territory in northwestern California, listed by family and cross-indexed on p. 391 according to uses; brief comparative notes are added.

Pictures of Ivory and Other Animal Teeth, Bone and Antler, with a brief commentary on their use in identification. T. K. Penniman. Occasional Papers on Technology 5, Pitt Rivers Museum, Oxford University Press, 1952. 40 pp., 20 plates. Price 10 shillings.

Separate brief chapters are devoted to African elephant, Indian elephant, and mammoth ivory, hippopotamus teeth, walrus tusks, sperm whale teeth, narwhal tusks, vegetable ivory, boar tusks, and deer antlers. The excellent illustrations are transverse and longitudinal sections, mostly x3 or x4.

The Culture of Security in San Carlos: a study of a Guatemalan community of Indians and Ladinos. John Gillin. Publication No. 16, Middle American Research Institute, Tulane University, New Orleans, 1951. pp. 128.

This well-done descriptive and analytical study, in human geography as well as in sociopsychology, is fully reviewed by Benjamin D. Paul in the April-June 1952 *American Anthropologist* (Vol. 54, No. 2), pp. 240-242, and by George M. Foster in BBAA XIV (1951), II:119-120, Mexico, 1952.

Anthropology in British Columbia: No. 2, 1951. British Columbia Provincial Museum, Victoria, B.C., 1951. pp. 52, 9 pls. $1.00.

Like the previous annual report for 1950 (noted in *American Antiquity*, Vol. 17, No. 3, p. 278, January 1952), this valuable compilation includes a survey of current progress in all fields of anthropology in the area, with a bibliography for 1951, and also original articles. The general survey of "Anthropological Research and Publication" is by Viola Garfield and Wilson Duff, with the sub-heads Ethnology, Archaeology, Acculturation, Physical Anthropology, Institutional (activities at the University of British Columbia; the Second Alaskan Science Conference), Publications, Summary (trends and needs, combined projects).

Two of the contributions are ethnological ("The Cowichan knitting industry," by Barbara S. Lane, and "Notes on Carrier social organization," by Wilson Duff); the third is an important though brief general survey of Pacific Northwest archaeology — "Facts and Problems of Northwest Coast prehistory," by Charles E. Borden.

This discussion combines concise summary of the evidence and reasoning for the increasingly-supported view that Northwest Coast culture represents an adaptation to maritime life of an originally interior culture, and that the Tlingit and other Athapaskawans came down to the coast comparatively late, where they encountered people of Eskimo-like culture. There is also a detailed comparison of whale-hunting among Nootka (including Makah), Aleut-Koniag, and Northern Eskimo, in support of the logical hypothesis that the Wakashan-speaking peoples, first the Nootka and then the Kyakiutl, were the Indians originally on the coast and in direct contact with Eskimos. Archaeological findings by Dr. Borden in the Fraser Delta region are then analyzed, in three groups: 1. Early period — Eskimoid cultures; 2. Intermediate period — Interior cultures in transition; 3. Late period — Developed southern aspect of Northwest Coast culture.

NOTES AND NEWS

HISTORIC SITES

In the Autumn 1951 issue of *Archaeology* (Vol. 4, No. 3 [15], pp. 155-8), an article by H. R. Holand, "The age of the Newport Tower," takes issue with the findings of William S. Godfrey (reported in *American Antiquity*, Vol. 17, No. 2, 1951), criticizing the interpretation of excavation results and arguing that the Newport Tower corresponds to a type of Catholic sanctuary and was built before 1630. Mr. Godfrey has promised this department a comment, though he feels that further controversy is pointless at this time. A story in the *New York Times* for May 11, 1952, reports the finding on Cape Cod, by diggers of the Massachusetts Archaeological Society, of possible remains of Leif Ericsson's landing place. Details or confirmatory opinions have not been received.

In the field of Spanish remains in the New World, historical archaeology in Georgia is noted in the July and October issues; a survey in southern Mexico was mentioned in the April issue (*American Antiquity*, Vol. 17, No. 4, p. 393). John M. Goggin, "A Spanish frontier outpost," *Florida Historical Quarterly*, October 1951, reports on the archaeological investigation of San Francisco de Pupo, on the St. Johns River west of St. Augustine at the crossing of the trail to Pensacola in the eighteenth century. Goggin is finishing work on a monograph dealing with Spanish majolica in the New World which will be ready for the printers in early spring.

The Georgia Historical Commission has sponsored a survey of presumptive Spanish-Indian contract sites of 16th to 18th centuries on the Georgia coast, with Lewis H. Larson, Jr., conducting the survey. Sites on the mainland near Darien and on islands to the north were investigated this summer. Larson reports good evidences of Spanish-Indian contract on 16 sites, with excellent site identification for two mission sites and the probable finding of the large historic settlement of Yoa. The Historical Commission also collaborated with the Fort King George Association of Darien, Georgia, in the exploration of a Spanish Mission site on Darien Bluff. Here materials from a Spanish mission occupation, apparently two phases of building, the 1721 Fort King George site, Old Darien (1736-1742), and later colonial settlements are found juxtaposed along the bluffs. Joseph Caldwell found Spanish ware and parts of a building with clay-lined storage pits here 12 years ago. Sheila K. Caldwell is supervising the present excavations for the Georgia Historical Commission and the Fort King George Association; Bessie Lewis is historian for the Association.

A still later site at the other extreme of continental New Spain is discussed by Robert J. Drake, "Samplings in history at the Sanchez adobe, San Mateo county, California, "*El Palacio*, Vol. 59, No. 1, pp. 19-29, January 1952; current work on another such site in California is reported in the *American Antiquity*, Vol. 18, No. 2, p. 190.

A note by Watson Smith, "Mural decorations in seventeenth-century Southwestern missions," *El Palacio*, Vol. 59, No. 4, pp. 123-25, April 1952, supplements his exhaustive treatment of the subject in the report by J. O. Brew and others on *Franciscan Awatovi* (Peabody Museum Papers XXXVI, Cambridge, 1949) with discussion of a previously overlooked fragmentary surviving example from Giusewa, New Mexico (San Jose de Jemez).

But the item of greatest interest in the Hispanic line is the accidental finding last year, at the 1598-1610 headquarters of Don Juan de Oñate, the founder of New Mexico, of an iron helmet identified by Harold Peterson, of the National Park Service (Washington, D.C.), as a salade of the type made around 1500, and the oldest piece of armor yet found in this country: Marjorie F. Lambert, "Oldest armor in the United States discovered at San Gabriel del Yunque," *El Palacio*, Vol. 59, No. 3, pp. 83-87, March 1952; Harold E. Peterson, "Spanish archer's salade found in New Mexico," *Military Collector and Historian*, Vol. 4, No. 2, pp. 46, 48, June 1952; Harold E. Peterson, "The helmet at San Gabriel de Yunque," *El Palacio*, Vol. 59, No. 9, September 1952.

Exploration at Fort Caroline in Florida, on the St. Johns River near Jacksonville, was carried on for two weeks in September by Charles Fairbanks of the National Park Service. Fort Caroline (1564) was the earliest and most southerly of the French colonizing attempts, but the Spanish considered it too close to their domain, and destroyed it the following year. No French or Spanish material was found in the excavation, and it is evident that any remains which may have been present were washed away. The only artifacts found were a very few Indian sherds of the St. Johns II period and a small amount of glazed ceramics dating from the beginning of the 19th century.

For the first time, a Dutch site is included in the summaries received. When the traditional site of the first Dutch settlement in North America (1631), called Zwaanendael, was threatened by modern construction in the spring of 1952, the Sussex County Archaeological Society (Delaware) began field explorations in an attempt to discover the exact location and plan of the original fort. The work was in progress during October.

In the line of Colonial archaeology proper, that of British settlements in North America, two excavations of eighteenth century English structures in the Southeast, at Fort Charlotte, South Carolina, and at Fort Frederica National Monument, Georgia, were reported in *American Antiquity*, Vol. 17, No. 4, p. 391. Items of special interest in Charles Fairbanks' work at Fort Frederica (involving excavation of the foundations of two English houses of the 1740's) are the finding of Chinese porcelain, and the stem of a goblet among fireplace bricks which may represent the regrettably declining custom of hurling the glass down after a toast to the King.

Important archaeological discoveries continue to be revealed at Saugus, Massachusetts, where Robbins is doing a splendid job with the excavation and reconstruction of that important early seventeenth century ironworks.

A booklet by J. C. Harrington on the glasshouse site at Jamestown, Virginia, (1608) has just been published; it is a condensed version of the full-length report (not yet published).

As part of the River Basin salvage program of the National Park Service and the Smithsonian Institution, the site of Fort Charlotte in South Carolina was excavated in the spring of 1952 under the direction of Joseph Caldwell. The site will be covered by water upon completion of the Clark Hill Reservoir. Fort Charlotte, erected by the British in 1766, was captured by a company of American Rangers in 1775, marking the first seizure of Crown Property in the Revolutionary War.

At Pettigrew State Park in the great swamp area of northeastern North Carolina, W. S. Tarlton has uncovered very interesting remains at the Collins Plantation site in connection with restoring that extensive late eighteenth century plantation.

E. Lawrence Lee is making preliminary explorations at the important English port city of Old Brunswick, North Carolina, under the sponsorship of the University of North Carolina.

The military career of George Washington, along with the French and Indian War, began with the battle in Western Pennsylvania at Fort Necessity in 1754. The fort, now a National Battlefield Site, was reconstructed on the original site in 1932. Preparatory to extensive repairs, the National Park Service carried on archaeological explorations during August and September, 1952, under the supervision of J. C. Harrington.

Probably the most extensive archaeological investigation of nineteenth century sites continues as a phrase of the Missouri River Basin Project, Smithsonian Institution, with field headquarters at Lincoln, Nebraska. Since July 1951, several important sites relating to the fur trade and military eras have been excavated in Missouri River "mainstem" reservoir areas by Smithsonian archaeologists, working under the general direction of Merrill J. Mattes, Regional Historian, Region Two Office, National Park Service.

In the Fort Randall Reservoir area (Gregory, Charles Mix, Lyman, Brule, Buffalo, and Hughes Counties, South Dakota), Carl Miller, in 1951, completed excavation of Fort Lookout, a site related to the St. Louis fur trade and occupied intermittently until 1850. In 1952, John Mills conducted an intensive archaeological reconnaissance to pinpoint the site of Fort Whetstone and other features of the Whetstone Indian Agency (1868-72), successfully locating the stockaded area. Following excavation of military structures at the foot of the giant Fort Randall Dam, Mr. Mills moved southward and excavated the site of old Fort Kirwin (1865), in the Kirwin Reservoir area, Solomon River, Kansas.

In the Garrison Reservoir area, above Bismarck, North Dakota, in 1951, G. Hubert Smith completed excavation of Fort Stevenson (1867-83), a typical military post of the Upper Missouri. In 1952, he supervised excavations at old Fort Berthold (1858-74), a historic trading post and Indian agency. This project has been concurrent with excavation of approximately 20 earth lodges in the adjacent Indian village by the State Historical Society of North Dakota.

In 1953 it is planned that work will be concluded in both the Fort Randall and Garrison Reservoir areas. Beginning in 1954 the program will be carried into the giant Oahe Reservoir area, above Pierre, South Dakota.

In the historical field of the Pacific Northwest, Louis R. Caywood, National Park Service (Vancouver, Washington), reports that the fifth excavation season has been completed at Fort Vancouver. Except for minor details this concludes the work at this important Hudson's Bay Company site. The fort was the headquarters for all Hudson's Bay Company activities for the area west of the Rocky Mountains from Alaska to California. The excavations revealed the various stages of development and progress at the fort from 1828 to its abandonment in 1860. It grew from a 300 foot square stockade to one that measured 733 feet by 326 feet.

Caywood started excavations on the two Fort Okanogan sites near the confluence of the Okanogan and Columbia Rivers. One fort was established in 1811 by John Jacob Astor. This site was relinquished to the Northwest Company in December 1813 after the war of 1812. Its location was determined by test trenches but the site was not excavated. The Hudson's Bay Company site at Fort Okanogan was built during the summer of 1816 at another nearby location about a mile and a half away on the Columbia River and was fully excavated under the direction of Mr. Caywood.

The third season's work at Fort Spokane and Spokane House was done by Caywood late in the summer. This completed excavation on Fort Spokane, the site first built by John Jacob Astor in 1812 and later taken over by the Northwest Company in 1814. The Hudson's Bay Company combined with the Northwest Company in 1821 and assumed command of the fort which was occupied until 1826 when it was abandoned and the business moved to Fort Colville. Spokane House, the first establishment in the State of Washington and the first of three forts near the confluence of the Spokane and Little Spokane Rivers was not located. A rich Indian burial ground was discovered during the search for Fort Spokane.

An important reference on the first English visit and claim on the Pacific Coast, not cited in the July 1951 issue (*American Antiquity*, Vol. 17, No. 1, p. 80), was: R. F. Heizer, *Francis Drake and the California Indians, 1579*, UCPAAE Vol. 42, No. 3, 1947 (52 pp., ill.; $2.00).

Finally, we may mention here a paper published in a historical journal instead of an archaeological one, which is the reverse of historical archaeology, a study of historical information on distribution and identification of Southwestern Indian tribes in the seventeenth and eighteenth centuries: A. H. Schroeder, "Documentary evidence pertaining to the early historic period of southern Arizona," *New Mexico Historical Review*, Vol. 27, No. 2, pp. 137-67, 1952.

EARLY MAN

A paleo-Indian site on a high sand terrace 300 feet above the Missisquoi River near St. Albans, Vermont, reported in this issue by William A. Ritchie suggests a relationship with the Shoop site recently reported by Witthoft in eastern Pennsylvania (*Proceedings of the American Philosophical Society*, Vol. 96, pp. 464-95, 1952), and the Williamson site reported by McCary in southeastern Virginia (*American Antiquity*, Vol. 17, pp. 9-17, 1951).

For additional recent finds of "Early Man" still further north, in Alaska and the Aleutians, see the expedition reports under ARCTIC below.

A joint expedition of the Denver Museum of Natural History and the Field School of the University of Denver, under Marie Wormington and Robert Lister, respectively, continued work at the Taylor site in Mesa County, Colorado, during the summer. It was aided by a grant from the Wenner-Gren Foundation to Wormington. Seventeen feet of cultural deposits were exposed, with no pottery below the surface. Milling stones with extremely shallow basins resembling those of the Chiricahua complex were found. The artifact assemblage is, however, distinctive, and is designated the Uncompahgre Complex. Many shapes of projectile points and great size variations were found, but no very small points occurred below the seven-foot level. Two slab-lined cists were discovered, one at the eight-foot level and another at fourteen feet. Animal bones were extremely rare although they occur in abundance in Montrose County sites of the same complex; a seasonal variation in economy is suggested.

Preliminary geological studies by Charles B. Hunt of the U.S.G.S. provide a tentative correlation of the shelter deposits with alluvial valley fills which place the time of occupation in the Tsegi-Calamity-Piney Creek period, within the first or second millennium B.C. Charcoal collected here and in one of the Montrose County sites is being submitted for radiocarbon dating. A brief reconnaissance was also conducted in the Montezuma Creek area of Utah, where the Reverend Eugene Botelho has found points resembling the Pinto Basin type.

E. W. Haury of the University of Arizona plans some limited testing at the Naco, Arizona, elephant site during the winter months.

The University of Nebraska State Museum put in a fourth season of work during the summer at the Red Smoke site (25FT42) in the Medicine Creek Reservoir area, Nebraska. James H. Gunnerson supervised the excavation under the direction of E. Mott Davis. Red Smoke is a stratified site, the main occupation level being a campsite and workshop with points of the Plainview type and others resembling Plainview but having a pronounced right-hand bevel. A few points and fragments resembling Plainview came from below this stratum, suggesting that the type covers a considerable time span here. Two stemmed points came from another part of the site, but the stratigraphic relationship to the Plainview levels has not been established. Intensive geological work indicates that the sedimentary history of this site may be more complex than originally thought. The strata extend from the terrace into a hillside. The Plainview levels may be early Mankato in age, for the Red Smoke, Lime Creek (25FT41), and Allen (25FT50) sites are all in the lower part of the fill of Republican River terrace 2-A, tentatively correlated with the Mankato advance (Wisconsin IV). A good deal of charcoal was collected from different levels, which when dated should clarify the alluvial sequence. A discussion of these three sites, their radiocarbon dates, and cultural relationships, by Davis and C. B. Schultz, appears in *Science* for March 14, 1952, pp. 288-90. This article mentions bowl-shaped hearths without stone lining for these sites, a trait which may have wide significance in the Plains on this general time level.

At the Horner or Sage Creek site in Wyoming, discovered by James Allen of Cody, a joint Princeton University-Smithsonian Institution expedition carried on work in archaeology, geology, and paleontology from June to September 1952. G. L. Jepson of Princeton led the expedition, assisted by W. R. Wedel of the Smithsonian; and geological work was done by John Moss, with a drilling crew from Franklin and Marshall College. This work continued that done by Jepson in 1949 and 1950.

The site is on the Cody terrace near the confluence of Sage Creek and Shoshone River, about 4 miles northeast of Cody. It was evidently both a butchering ground and a campsite. The fragmentary remains of about 200 bison have been recorded; and among the bones have been found a number of parallel-flaked shouldered Eden and Scottsbluff points, small end scrapers, oblique-bladed stemmed knives, other cutting and scraping tools, gravers similar to those found by Roberts at Lindenmeier, Colorado; miscellaneous chopping, rubbing, and pounding tools; and a few scratched or otherwise possibly worked bone fragments. It is believed that the more than 200 artifacts now available will permit the definition and naming of a complex embracing some of the so-called "Yuma" artifacts. Petrological studies give indication of the possible sources of some of the materials.

No certain evidences of habitations or other structures came to light. Burned areas believed to represent hearths of rather transitory nature have yielded charcoal samples for radiocarbon dating. Laboratory studies are under way, with a report in view which will combine the various aspects of the work.

In north-central Alabama, Frank J. Soday of Decatur reports a new fluted-point locality which he designates the Quad site. It is on a deeply eroded ridge paralleling a small stream, Beaver Creek, near its junction with the Tennessee River. The site contains two components, one paleo-Indian with fluted points and other artifacts, the other Archaic. Several hundred artifacts have been recovered, on which Soday makes the following observations:

The Quad site tools appear to include the total inventory of both the Enterline chert industry and the Parrish site industry (*Univ. of Ky. Reports*, Vol. 7, No. 6,

1951). One fluted point conforms to those at Lindenmeier (*Smithsonian Miscellaneous Collections*, Vol. 94, No. 4, 1935) in all important respects, except that the channels are relatively short. The Quad component includes small fluted points, larger fluted points resembling the Clovis type, channel flakes, flake knives (usually finely retouched), side and end scrapers derived from lamellar flakes, gravers, choppers, saws (?), chert chisels or planers, and possibly drills. A chert gouge similar to "Clear Fork" gouges described by C. N. Ray in Texas has also been found on the site.

The fluted points are quite thin at the base, and well ground on the base and basal edges. The bases are concave and on the smaller points the widest part of the blade is beyond the midpoint. The basal ears are generally rounded. All specimens exhibit very fine secondary chipping along the edges and at the tips. The majority have been fluted by the multiple-flake technique described by Witthoft at Shoop. This involves removal first of two channel flakes from each face, side by side, followed by removal of a large central flake from each face which obliterates the first pair except for their outer edges. At least two of the fluted points were reworked and used by the later Archaic inhabitants of the site. One had later been provided with a stem, while the second has the distal end reworked. Parallel-flaked and obliquely-flaked points also appear to belong to this component. It is interesting to note that Webb found 24 obliquely-flaked points at the Perry site near Tuscumbia, Alabama.

The Enterline scraper forms are present at Quad in some numbers, but do not comprise as large a portion of the total assemblage as at Shoop. The side scrapers generally are quite large and made from curved lamellar flakes or blades. The snub-nosed end scrapers are like those of Enterline, and some possess thick graver spurs. Two scrapers are notched, perhaps for hafting. Gravers are present in substantial numbers and quite finely made, resembling Lindenmeier gravers. Lamellar flake knives of the Enterline form are common, as are knives made on long narrow flakes. Both forms are very finely chipped along the cutting edges. A substantial number of the knives terminate in graver points. One flake knife has been notched, possibly for hafting.

The Quad site resembles Shoop in another respect, namely, the relative scarcity of chips. Although all loose chips were carefully collected, almost as many artifacts as chips have been recovered. Substantially all of the artifact forms described by Webb for the paleo-Indian component at the Parrish site in Kentucky have been found at Quad; this is particularly true of combination tools such as knife-scraper, scraper-chisel, and graver-scraper.

The succeeding Archaic component is characterized by an abundance of side-notched and straight and convex-based points, generally small in size. Some resemble Plainview points (*Geological Society of America Bulletin*, Vol. 58, pp. 927-54, 1947). These Archaic forms differ in lithic material and degree of patination from the earlier component. A very high proportion exhibit basal thinning and basal and side grinding, which may indicate that the Archaic population were direct descendents of the paleo-Indian occupants, continuing these traits into a later period; or the Archaic population may have revived such traits as the result of finding and reusing fluted points exhibiting these features. While the site is badly eroded, some areas may permit stratigraphic study. If preliminary trenching is encouraging, Soday will attempt to interest professional archaeologists in this site.

The geochemical analysis of middens and soils at Kinchafoonee, near Albany, Georgia, and in the Melbourne Beach area of Florida, has recently been reviewed by V. P. Sokoloff and George F. Carter in *Science* (July 4, 1952, pp. 1-5). They state that the methods presented "show that a difference of only 1000 years may be recognized in some datable midden profiles under certain conditions," and that "Our endeavor is to arrive at the orders of magnitude of time rather than to aim at an 'exact' dating, steering clear of any such archaeological delusion as the latter."

A. R. Kelly, University of Georgia, spent several days in the spring of 1952 at Kinchafoonee, removing all flint scrap and artifacts from six 5-foot squares in four arbitrary levels of 8 inches each, because there were no indications of natural stratigraphy. He makes the following observations:

"1. The level of 'cementation' is very marked; at a depth of 28-32 inches one trowels into a crumbly breccia in which the soil structure tends to approximate a stony condition, so compact is the cemented matrix. Flint scrap and flake tools continue into this cemented layer but not much deeper. From top to bottom, through the first three arbitrary cuts, flints and scrap are generally dispersed, but increase notably in the cemented level. This curious condition is reminiscent of the concentrations of highly decomposed flint in the A and B horizons at Macon Plateau, where I remarked on the apparent differential in flint and sherd dispersal through a weathered soil profile.

"2. Sound scientific scepticism will question whether the Kinchafoonee horizon containing weathered flint scrap and tools is truly a midden, for there is no shell or bone in it, although some mineralized bone was picked up in the ditch at the foot of the profile. The spring work indicated definitely, however, that the site was a workshop, although not in the sense of refuse accumulations in Archaic sites in Georgia and elsewhere.

"3. In the six pits, I found not a single projectile point, stemmed or otherwise. The material is all flint scrap, with flake knives and scrapers, the assemblage showing little relation or resemblance to the usual collections of prepottery sites in the general Albany area. All the flint is highly decomposed, much of it the 'rotten flint' so familiar at the Macon Plateau site. I am not yet ready to emphasize the apparent absence of projectile points or other typical Archaic specimens, for we have as yet tested only one side of the roadway. Stemmed points and other common artifacts do occur in the open fields near the road cut, and Carter and

Sokoloff did find two stemmed points at a depth of 18 inches in the 'midden' while obtaining soil samples. The implication would be strong that there was stratigraphy at Kinchafoonee of two different assemblages of flint tools, the deeper one showing absence of projectile points and the more definite end and side scrapers of the Archaic. But great caution and further work are needed.

"4. The worked flint and a few finished tools from Kinchafoonee show resemblance to flake tools and choppers from the Lane Springs site in Georgia, but the latter site shows less decomposition of flint and furthermore yields large, crude, unifacial chopper tools, heavy scrapers, ovate knives, and stemmed projectiles and scrapers."

The above information indicates that a long series of preceramic complexes may be found in Georgia, with gradual changes as well as some continuities, and that the "rotten flint" assemblages may connote a much greater antiquity than any known Archaic horizon. Continuance of the soil analyses in conjunction with more extensive artifact collections promise to open a new chapter in American archaeology. Radiocarbon datings should provide reference points in the chronological column, but datable material has not yet been found in sufficient quantity.

ARCTIC

SOUTHERN ALASKA. A program of integrated ethnological, archaeological, and linguistic fieldwork was carried out during the past summer among the northern Tlingit of Yakutat, Alaska. This represents the third season of field research into the history and dynamics of Tlingit society, inaugurated in 1949 by Frederica de Laguna of Bryn Mawr College. The research in 1952 was supported by grants from the Wenner-Gren Foundation and by financial aid given to student members of the party by the University of California. Linguistic investigations were made by Dr. Fang-Kuei Li of the University of Washington among Eyak-speaking natives at Yakutat and Cordova, for the purpose of determining the position of the Eyak language in the Na-Dene linguistic stock. The original inhabitants of the whole stretch of the coast from Cordova in Prince William Sound and the mouth of the Copper River to the western shores of Dry Bay on the Gulf of Alaska originally spoke Eyak, and in relatively recent times (probably during the early 19th century) this language was replaced by Tlingit in the eastern part of this area, that is, in the region around Yakutat Bay.

The archaeological and ethnological investigations were carried out under the direction of Frederica de Laguna. The archaeological field party, led by Francis A. Riddell, consisted of Donald McGeein, Arthur Freed, and Kenneth Lane, all from the University of California. They excavated a late prehistoric site which figures in native tradition as the oldest and most important settlement in the Yakutat Bay area. According to native history it was founded by a group who migrated to Yakutat from the lower Copper River and who acquired territorial rights from a still earlier group of residents. The site also figures in stories of later movements of Tlingit from southeastern Alaska, and it was apparently abandoned before European exploration and settlement in the latter part of the 18th century. About a half dozen house sites, several trash mounds, and numerous cache pits already have been discovered in the village site, and the material recovered is very similar both to what is known from later prehistoric horizons of the Chugach Eskimo of Prince William Sound and from the ethnology of the Copper River Eyak.

The ethnological investigations were made by de Laguna and by Catherine McClellan, now at the University of Washington. Efforts were concentrated on obtaining the traditional histories of the various sibs now represented at Yakutat. These groups are said to have come from the Copper River, from the coast between the Copper River and Yakutat, and from the Interior via the Alsek River and Dry Bay, east of Yakutat, and from southeastern Alaska. In a number of respects, Yakutat culture exhibits more of Interior connections than does the Tlingit Culture of southeastern Alaska. In addition, material was also gathered to give insight into the functioning of Yakutat culture and society in the last quarter of the 19th century and the transformations that have occurred since that period.

ALEUTIANS. A seven-man University of Oregon expedition spent the summer in the Aleutian Islands conducting anthropological researches in the villages of Nikolski and Akutan, with visits to some Koniag villages along the Alaska Peninsula. This work was supported by a grant from the Arctic Institute of North America. The party included W. S. Laughlin and G. H. Marsh, Department of Anthropology, University of British Columbia; John James, Department of Sociology, University of Oregon; J. W. Leach, Philip T. Spaulding, G. D. Berreman, all graduate students in the Department of Anthropology, and Philip Newman, undergraduate student. Transportation was provided by the U.S. Navy and the U.S. Coast Guard, employing both ships and planes.

Marsh extended his linguistic studies into the village of Akutan and found that the language spoken there belongs properly within the eastern dialect and that Aleut spoken on the mainland similarly belongs in the eastern dialect. A number of stories were recorded. Studies were made of the contemporary village structure of Nikolski and ethnological studies were made in both villages. Secretor tests were performed in Nikolski and anthropometric dental and blood studies were made in Akutan. James made a special study of small groups in Nikolski.

Excavations were carried out at four places: Nikolski village, Agalagax at the south end of Umnak, at a village site on Ananiuliak Island and at the core and blade manufacturing station also on Analiuliak. Several pounds of blades (lamellar flakes) were collected, together with a smaller number of cores. The size range of these blades was comparatively great, running from 2 cms. to 11.5 cms. in length. They lay on the surface

of the ground in blow outs and none were found below the surface (cf. *American Antiquity*, Vol. 17, No. 1, 1951, and Vol. 18, No. 1, 1952). Excavations were made in a nearby village site. Though the site was 3 meters in depth only 3 blades were found, indicating that these people had little familiarity with this stone industry. Behind this village site were discovered a number of large depressions with drainage ditches on either side forming a triangle, the largest ditch being 39 meters in length. Laughlin's party was informed by the Aleuts that these were root storage pits. At a depth of approximately one meter was found a layer of volcanic ash. A similar layer was found at the base of the village site. No corresponding layer was found under the manufacturing station, which thus appears to contribute to the view that this was an early industry in the Aleutians.

Excavations in the old village site at Nikolski were confined to the most recent portion, some distance removed from previous excavations of 1948-50. Ground slate blades, long single-piece sockets and the round-headed neo-Aleut skeletons were recovered, which again gives evidence of the comparatively late arrival of these people and their associated traits. Excavations were made through one barbara pit which was supposed to have been occupied by the first Russians on this part of Umnak Island. Although no metal tools were found, one bone dish whose sides were held together with lead pegs was found. A previously unrecorded trait here was the presence of facets on the anterior teeth of skulls of individuals who had worn labrets. Peg shaped third molars were found in some of the skeletons recovered and also in one of the living Aleuts.

Mr. Leach directed an excavation at the south end village of Agalagax. He found ground slate blades, shallow lamps and other traits comparable to the later occupation at Nikolski. No core and blade material was found in these mainland excavations.

NORTHERN ALASKA. Personnel of the University of Alaska were dispersed as follows: James W. Van Stone to Nunivak Island; Charles Lucier to Kotzebue; Fred Milan to Karluk, Kodiak Island; Wendell Oswalt to Wasilla, South Alaska. Reports on the accomplishments of these individuals and of the Harvard group who worked at Point Barrow are anticipated for a later issue.

William Irving, working out of the Arctic Research Laboratory at Point Barrow, under an Office of Naval Research grant, explored the Lower Colville River and the islands east of the Colville delta. He reports that in spite of bad weather and ice conditions, he and his two Eskimo helpers managed to dig for a month on the islands off Oliktok Point. The sites examined were house mounds or pits rather than middens. Some of these appear to be 500 years old. A side trip by air into the Schrader Lake area turned up only temporary camps, most of which appeared to be recent.

Henry Michael of the University of Pennsylvania spent the summer on St. Lawrence Island where he excavated in old sites, mainly near Gambell, specifically in search of wood and charcoal for the radiocarbon dating of the various cultural levels.

J. L. Giddings and Alex Ricciardelli of the University of Pennsylvania, made use of an Office of Naval Research grant to collect driftwood samples for sea current mapping along the coasts of the Arctic Sea and to survey the coast for signs of early occupation. Several sites located between Flaxman Island and Barter Island appeared to be very recent. An exception may be a flint-slate site near Anderson Point, which appears to have an inland Eskimo tradition. A trip to Cape Denbigh in August resulted in the finding of two hearths of the Denbigh Flint complex, containing material for radiocarbon dating that should prove adequate for determining the times of succession at Iyatayet.

NORTHEAST

An impressive discovery at Sheguiandah, Manitoulin Island, Ontario, was announced by Thomas E. Lee of the National Museum of Canada. Assisted by 25 volunteer workers, including several members of the Ontario Archaeological Society, Lee excavated a hilltop habitation area presumed to have been an island when occupied some 5,000 to 7,000 years ago by a conservative estimate, as no artifacts are said to occur below an old beach line situated some 90 feet above the present level of Lake Huron.

More than 3,300 implements, all of quartzite, were obtained, consisting mainly of big blades up to 10 inches in length and 2 pounds in weight. Some stratigraphic differences in typology were noted. Between 7 and 14 inches below the surface the excavators uncovered quartzite flakes and a few very crude blades embedded in an apparent glacial till. Deposits below this depth were sterile, except for an occasional artifact which seemed to have been in pits dug into the till.

Excavation in one of several hillside dumps, some up to one-third of an acre in extent, revealed a solid rubble containing broken blades, rejects, etc., to a depth of 7 feet. Below that horizon came another foot of till-like material, containing chips and scattered crude blades. The entire mass rested upon an old quarry surface, traced in part for 38 feet along the slope.

According to Kenneth E. Kidd, The Royal Ontario Museum of Archaeology sent a field party for 6 weeks to do exploratory work on certain mounds at Cameron's Point and some of the village refuse deposits at the Serpent Mound on Rice Lake (both in southeastern Ontario), under the field guidance of J. R. Harper. The latter of these were studied by Boyle some 56 years ago and the former have been under cultivation much of the time. Cultural affiliations have not as yet been precisely determined. Kidd's year of research into trade goods under the Guggenheim Fellowship is at an end and the material is ready for processing.

Of unusual interest was a hoard or cache of 50 native copper tools and ornaments reported from Farquhar Lake, in the Haliburton Highlands region, northeast of Toronto, Ontario, by J. Norman Emerson of the University of Toronto. This accidental find by local residents

has not yet been officially reported, and the cultural provenience of the material is at present unknown.

The Cohannet Chapter of the Massachusetts Archaeological Society has been working at two sites, the Fort Hill station, opposite the previously reported Titicut site on the Taunton River, and the Wapanucket site on the shore of Assawompsett Pond, Middleboro, Mass. The former site seems to have included a small stockade, mentioned in the historic references; the latter, some 15 miles distant, also contained much material of the contact period among the 1,200 implements found in hearths, pits and graves. However, important differences were noted in the artifact assemblage and more work is planned for the coming field season by Maurice Robbins and his associates.

Phillips Academy (Andover), Douglas S. Byers reports, sent a party consisting of B. Irving Rouse and Kenneth Starr from Yale, Douglas S. Byers and Frederick Johnson from the Peabody Foundation, and William Young from Springfield to conduct reconnaissance at the Guida Farm at Westfield, Massachusetts in the hope of finding deep or stratified deposits. In this search they were not successful, but they did succeed in obtaining some information concerning the character of the site, which appears to have consisted of separate fire areas or hearths, which probably represent house locations. Three of these fire areas were examined; near them stone chips, a few implements, and fragments of pottery were uncovered. This evidence of occupation appears to have been scattered over a wide area, although there is no degree of depth.

Alfred K. Guthe, reports that the Rochester Museum of Arts and Sciences spent a second month on the Westfield site, Chautauqua County, New York, this past summer. Although no quantity of cultural material was recovered, we encountered additional storage pits which appear to have been filled in soon after their abondonment as storage pits. The pottery recovered indicates a prehistoric Iroquois occupation and shows certain similarities to cultural complexes in Ontario and western Pennsylvania. Interestingly enough, there seemed to be few parallels in the Ohio collections and in the collections from eastern New York. It suggests that the site was used as a stopping point while en route either north or south. Also excavated was a prehistoric Iroquois cemetery west of Rochester but still in Monroe County. This was done in what could be called a salvage operation since the area was being graded prior to its use as a housing development. As is customary, grave goods were few.

The search for fuller data on the classic Point Peninsula culture (Focus 2) led to the concentration of the investigations of the New York State Science Service in southeastern Ontario and adjacent northern New York. A party of four, in charge of William A. Ritchie, with some financial aid from the Wenner-Gren Foundation for Anthropological Research, excavated first at Collins Bay, Ontario, on a burial site of this culture which was found to have been largely destroyed in a housing development.

Greater success attended operations on the Indian River, Jefferson County, N.Y., where a number of stone crematories were found, similar to, but better preserved than those discovered and reported last year (*American Antiquity*, Vol. 17, No. 3, p. 286) on another site in the same region. In eight instances unburied cremations still remained *in situ* on the fire-shattered rock piles.

Nearby, intensive testing located a cluster of deep graves (up to 74 inches) containing both cremated and uncremated skeletal remains, together with red ocher and other burial offerings comprising another large cache, consisting this time of 245 thin blades; gorgets of several types; fire-making sets; and chipped flint tools. One of the cremations in these graves was intermixed with charcoal from the funeral pyre and what appeared to be burned remnants of a leather shroud, all of which had apparently been scooped up with the bones and an occasional stone from the rock cremation. Libby has kindly accepted this specimen for radiocarbon measurement, and theoretically the date should check with our sample from the Oberlander No. 2 site at Brewerton.

A second problem on which progress was made by the same group concerns the later developmental stages of the Owasco culture, with special reference to the new theory of Iroquois origins. A nearly unmolested village site in central New York produced a gratifying series of pottery specimens, along with lesser quantities of other materials. Seriation with the Owasco and Chance (early eastern Iroquois) sequences demonstrates that the new station occupies an intermediate position later than any yet recorded for the Owasco. Search will continue in this region next year for still more recent components which may provide clearer transitional Iroquoian linkages.

In Connecticut, according to B. Irving Rouse, the Willimantic State Teachers College, under the direction of Eva L. Butler, excavated this summer at the Green Haven site near Westerly, R.I., finding material of the Niantic Focus, similar to that already known from the neighboring Davis Farm site. Frank Glynn has been digging a stone heap in Westbrook. This is the first such site to be investigated in Connecticut, although they are well known from the historic sources, and Glynn's finds show definitely that they are Indian, although he did not obtain enough artifacts to indicate the period. The New Haven Chapter continued its work at Grannis Island, with results comparable to those of previous years. A preliminary report on this site is in press in the Connecticut *Bulletin*, together with G. D. Pope, Jr.'s account of his excavations at the Charles Tyler site near Danielson.

Survey, excavation and exhibition activities are reported by William J. Mayer-Oakes, in charge of the Upper Ohio Valley Archaeological Survey of the Carnegie Museum, Pittsburgh. In the course of survey work, which this year was concentrated in the central section of the Upper Ohio Valley from Pittsburgh to the West Virginia line, the deepest stratified site yet known from the Upper Ohio Valley was found. Stratigraphic test

excavations produced ceramic materials pertaining to every major group known from the survey area and a definite sequence is indicated by the analysis. The last major drainage area to be examined by the survey comprised the lower and middle Allegheny Valley where work was begun in August. Earlier in the season test excavations were made at the Scarem and Johnson sites, the latter of which will be covered by the Conemaugh River Reservoir. Apparently this late prehistoric village, linked by artifact similarities with towns in the Monongahela drainage, was surrounded by a large stockade and refuse-filled ditch. In September 1952 the excavations begun in 1951 were completed on the Savage rock shelter in Maryland.

Exhibition work of the Upper Ohio Survey included cooperation with the West Virginia Archaeological Society in connection with the installation of the Grave Creek Mound Museum at Moundsville, W. V., which was opened to the public on July 4, and a preliminary display illustrating the work of the Survey at Carnegie Museum. A major exhibit and a detailed report will be completed next year.

NORTHERN MISSISSIPPI VALLEY

Illinois. The University of Illinois had a party of students in the field in the general area of the lower Illinois River, working under the direction of John C. McGregor. The problem of primary interest was the Irving site, in Pike County, just across McGee Creek from the Pool site worked two years ago. The lower levels of the Irving site contained pottery types similar to those from the upper portions of the Pool site, but the later occupations differed from the Pool finds. It is thought the material represents a nearby continuation of the chronology set up on the basis of the Pool work. In fact the material is so closely related that McGregor has brought the Pool manuscript back from the press to add this last material to it before publication. It appears that the Pool and Irving people occupied the immediate area at about the same times, at least in part, but had different cultural backgrounds. A limited time was also spent in excavation at a prepottery site, a Black Sand site and a very early Bluff site in the same general area. A few Mississippian burials, with offerings, were found as well.

Indiana. The field school at Angel mounds was again sponsored by the Indiana Historical Society and under the direction of Glenn A. Black. A small mound west of the principal mound of the site was partially excavated. Three house building levels were present, the houses being of the square and round types. The lowest house contained features not before encountered at Angel site and all had been semi-subterranean. Unlike dwellings east of the principal mound, the walls of the square houses found this past season were oriented with the cardinal points. East of mound A they had all been erected with the corners to the cardinal points.

A stone mound in Shelby County was completed during June bringing to an end a student project which had been carried on during the past year. Although some traits do not conform to the general pattern of Adena there was material present which leaves little doubt but that the mound was Adena in affinity.

Spencer County was surveyed by James H. Kellar with interesting and abundant results. This county had been heavily inhabited and all complexes of this part of Indiana were represented.

Iowa. Excavations at the Effigy Mounds National Monument in northeastern Iowa and in the general vicinity were conducted by Paul L. Beaubien and Wilfred D. Logan of the National Park Service. Beaubien excavated five mounds in the Sny Magill group south of McGregor, Iowa, one of which was a bird effigy and the others conical in shape. The largest conical was most productive, containing burials placed upon red ocher beds and artifacts including long chipped stone blades, spherical copper beads and large projectile points. A small conical mound contained small, triangular projectile points. Sherds in the fill of both the bird effigy and the large conical mound bore dentate rocker impressions as well as cord imprints. A considerable range in time would appear to be indicated for the various mounds composing the group. Beaubien also excavated a second mound in the Monument area adjacent to the Hopewellian mound previously dated by radiocarbon analysis as 900 ± 300 B.P. While the second mound excavated was also a Hopewellian mound, it contained a different assemblage of traits. Burials were in an excavated subfloor pit with the grave goods consisting of a copper breastplate which preserved portions of a twined textile. A second conical mound, located at the end of a series on the bluff, was excavated under the supervision of Logan. A burial in this mound also had a copper breastplate with fragments of textile adhering to it in association and with a second burial were three tubular copper beads.

Michigan. There was no extensive and continuous field work in Michigan this summer, but members of the various chapters of the Michigan Archaeological Society during the past year have located several new sites, and several days digging on an Owasco site near Rochester salvaged a considerable amount of skeletal material from commercial gravel operations. The Grand Rapids chapter of the Society has made some progress toward preservation of the large Hopewellian mound groups in that area.

Minnesota. The 1952 field work of the University of Minnesota under the supervision of Lloyd A. Wilford was primarily devoted to the study of mounds threatened with imminent destruction by building and plowing activities. All were in the middle of the state where the practice of bundle burial without grave goods makes mound excavations rather unrewarding. A mound at Mille Lacs Lake had the charred ends of many logs laid in a checkerboard pattern, with calcined and charred human bones below the logs. It was evident that bones and not bodies were burned here. A few sherds in the

mound, and also the distance of the mound from the present lake shore, indicate that the mound is of the older or Malmo focus of the Mille Lacs aspect.

A mound at Nest Lake near Willmar had bundle burials at the original ground level, in so advanced a stage of disintegration as to suggest that this too was of the Malmo focus. Two mounds at Lake Hanska, southwest of New Ulm, had been so lowered by plowing that bones were being plowed up. Both had bundle burials on the mound floors, though a few primary burials were also present. The bones were in excellent condition. A test of an occupational area between the mound and the lake yielded late Woodland sherds, and from the uppermost layer came two triangular arrowheads. The later, or Kathio, focus of the Mille Lacs aspect is suggested.

One of the three ditched sites on the eastern bluff of Lake Traverse was tested. A trench across the ditch revealed that it had originally only been slightly deeper than at present and that in its construction the dirt removed was piled on the outside. No post holes of a possible palisade were found. A test square inside the ditched area yielded late Woodland sherds of the Kathio focus and a circular cache pit dug 20 inches into the subsoil.

In September Wilford was twice called to Red Wing where the State Highway Department had started hauling gravel from a village site of the Silvernale aspect (Middle Mississippi), and where skeletons and pottery were being found. Stripping operations had exposed many storage pits, fire pits, and refuse pits. Only two skeletons, both primary burials, were seen *in situ* by Wilford. An adult was buried on his back, but as the bulldozer had disturbed the legs, it is not know whether is was flexed or extended. The second skeleton was that of an adolescent of 13 or 14 years, clearly buried in an upright sitting position in a pit. The mortuary vessels accompanying burials at the site very closely resemble the rolled rim Aztalan wares.

Missouri. The sixth summer field session of the University of Missouri, under the direction of Carl H. Chapman and with Robert T. Bray as assistant, was held primarily within the proposed Table Rock Reservoir area on White River in Stone, Barry, and Taney counties, Missouri. A rock shelter in Taney County and a rock shelter and a cave in Barry County were tested. An extensive test was made on another rock shelter in Stone County. The latter proved to be of considerable interest. The fill in front of the rock overhang contained evidence of two nonpottery horizons, capped by a pottery horizon. The deposit within the shelter was not more than 2½ feet deep and seemed to have been built up by the last occupants of the site, the pottery makers. The pottery was shell tempered ware, flat bottomed, and with no decoration. Associated projectile points were small willow leaf "Nodena" type and small notched points. The two nonpottery horizons appeared to be related to the preceramic material of the Grove focus of northeastern Oklahoma. Future excavations are planned for the site.

The last few days of the field session were spent in the Pomme de Terre Reservoir area on the Pomme de Terre River in Hickory and Polk counties, Missouri. Following the close of the regular field session, work continued under Chapman's supervision in conjunction with the National Park Service project for salvage of archaeological information in that area. The bulk of the time was spent in making surveys of parts of the area not previously investigated and rechecking a number of old site locations to obtain surface collections from them. The Ozark Chapter of the Missouri Archaeological Society cooperated on the surface survey work and a number of the members donated material they had picked up in the region for study purposes. Those donating particularly valuable collections were Marvin E. Tong, Jr., John C. Vinton, Mr. and Mrs. John Lembcke, and Mr. and Mrs. Helmer Turner. Numerous others either loaned material to photograph or supplied photographs of artifacts from particular sites. The last few weeks until mid-September were spent in testing three sites. Tests will continue until about the first of December.

The University of Missouri, in cooperation with the Missouri Archaeological Society, held another field trip to Graham Cave on October 19th, continuing the excavation of the part of the deposit that is threatened with removal due to the land owner's need of the storage room for farm equipment within the cave. More than thirty members of the Society participated and a great deal of work was accomplished.

The research program of the Museum of Anthropology, University of Michigan, in the central Mississippi Valley was continued by Edward G. Scully and Stephen Williams. A number of sites in southeastern Missouri and northeastern Arkansas were investigated by test pitting and surface collecting.

Ohio. The Department of Archaeology of the Ohio State Museum conducted excavations of two sites during the summer season under the direction of Raymond S. Baby, Curator of Archaeology.

From June 15th to July 25th, a joint expedition with the Sociology Department of Ohio State University, investigated the Highbanks site, a hill-top enclosure located on a bluff along the east side of the Olentangy River north of Columbus. A series of trenches through the walls and in the interior revealed that the enclosure was constructed and occupied during the Woodland period, probably by the Hopewell people.

During the month of August a small field party of students from Ohio State University, supervised by William H. Sassaman of the Department of Anatomy, Western Reserve University, carried on a preliminary survey of the Hopewell village site and circular earthworks in the valley just south of Fort Hill. Excavations here revealed a post hole pattern of one wall of a house site as well as other sub-soil features. Projectile points, flake knives, and scrapers fashioned from Flint Ridge and

Harrison County, Indiana flint, as well as mica, and potsherds were among the artifacts recovered.

Late in the season, Baby, in cooperation with the Anthony Wayne Commission, conducted salvage excavations of the powder magazine of Fort Washington (1789) in the city of Cincinnati, Ohio.

WISCONSIN. The early prehistory of Wisconsin received attention this past summer when a joint field party from the Milwaukee Public Museum and the State Historical Society of Wisconsin excavated a cemetery in northeastern Wisconsin. Working under the auspices of the Wisconsin Archaeological Survey, the field party consisted of Warren Wittry, Arthur Niehoff and Robert Ritzenthaler, the latter being in charge of the dig. The site had come to notice in the spring, when copper implements were found associated with burials while gravel was being removed from a low ridge on the western outskirts of the city of Oconto. Local interest in the site and the acquisition of the property by the Oconto County Historical Society protected it from further destruction until the excavations were begun in July. Although scattered post holes were found, the site is primarily a burial ground where shallow graves (two to three feet deep) contained single and multiple interments. Types of disposal included bundle reburials and primary burials in flexed, semi-flexed and extended (prone and supine) positions. In addition to the 34 individuals represented in these interments, 8 basin-shaped cremation pits were found, some of which contained the remains of more than one individual.

Artifacts were found with all of the forms of burial but with only about one-third of the total number. Copper implements include crescents, spatulas, awls, a fish-hook, and both socketed and flat tang spear points. The only ornaments of copper were a bracelet, a spiral coil of strip copper and several small clasps. In shell, a bracelet of pond snail shells and unworked fragments of a marine shell were found. Chipped stone projectile points were either side notched or had a slightly tapering stem. One of the most interesting finds was a bone whistle which had been placed at the back of the neck of an infant or young child. It is believed that the site will make it possible to formulate a basic definition of the Old Copper complex.

The excavation of a conical mound in Mound Park located within the limits of the city of Rice Lake was undertaken under the supervision of Leland Cooper of Hamline University. The work was sponsored by the city which is contemplating the restoration of the mounds in the park. Although the mound fill had been disturbed by prior excavation, several subfloor burial and fire pits were found. One pit contained the remains of a bundle burial of six adults and one child. Burial associations included a slate knife, 6 triangular projectile points, a section of deer antler with a beaver's tooth set in a perforation, 2 bird claws, a pottery pipe, a small polished celt, and fragments of sheet copper.

PACIFIC NORTHWEST AND CALIFORNIA

BRITISH COLUMBIA. Charles E. Borden, University of British Columbia, continued archaeological work during the summer in the little known plateau of central British Columbia with financial assistance from the Provincial Government and the Aluminum Company of Canada. Excavations were made at nine sites in an area of Tweedsmuir Park to be flooded by the Alcan power reservoir and at Chinlac an abandoned Carrier Indian site a short distance east of the park. The excavation of one rectangular house at Chinlac revealed Carrier Indian culture at the time of and just prior to white contact. This material made it possible to gain some perspective for the remains from the Tweedsmuir Park sites, all of which appeared to be prehistoric. Artifacts identical or very similar to those from Chinlac were recovered from nearly all of the Tweedsmuir sites. They included numerous small chipped projectile points of various types, knives, scrapers, drills, and a few adze blades. Adze blades were first chipped and then ground into shape. Favored materials were basalt and obsidian. A characteristic trait of the Carrier seems to have been the thrifty use of small flakes for cutting and scraping which are usually discarded by others as waste.

None of the typical Carrier material could be definitely linked with any of the numerous circular lodge remains in the Tweedsmuir area. Carrier implements were found in and just under the turf over the house pits but the house deposits themselves yielded implements that were definitely different in type, material and manufacture. Most abundant were large crudely chipped knives of rhyolite. Percussion flaking technique was favored. There were also numerous lamellar flakes which had been struck from prepared cores. One polyhedral core was recovered from a central hearth area. House details included an oblong area about six by nine feet by three feet deep in the center of the house with the charred butts of rafter beams and side rafters between sixteen and seventeen feet from the center of the pit. The rest of the floor area was only a little below the surrounding ground level.

The work revealed typical Carrier Indian material in association with rectangular houses or at temporary hunting and fishing camps. At least some of the circular earth lodge remains in Tweedsmuir Park seem to have been built by a different people of a different culture who appear to have occupied the territory prior to the arrival of the Carrier Indians.

WASHINGTON. Douglas Osborne, University of Washington, reports extensive archaeological work in the Plateau during the past summer. A crew led by Robert Crabtree, University of Washington, worked at a site in the upper McNary Reservoir near Pasco, Washington and in rock shelters near Ritzville, Washington. The Pasco area site gave important data on the earliest burial complex so far encountered. Three rock shelters yielded some data but were damp. No perishables were recovered.

Earl Swanson and Alan Bryan, University of Washington, spent the summer surveying the state of Washington for caves and rock shelters. Nearly 200 sites were recorded. Plans for cave excavations will be based on this work.

Warren Caldwell, University of Washington, conducted an archaeological survey of the Okanogan and Similkameen river valleys in northern Washington. This area is important as a connecting region between the southern and northern parts of the Plateau. Heretofore unknown cultural manifestations were found during the survey.

Interrelated activities between archaeological and ethnography have been encouraged by recent work. Norman Lerman, University of Washington, did field work with the Okanogan Indians in Canada and the United States and Mr. and Mrs. Albert Mohr will spend the fall and winter working with the Yakima. This work will form a foundation for later ethnohistorical research in the area. The work of Swanson and Bryan, Lerman, Caldwell, and the Mohrs have or will receive funds from monies granted to Douglas Osborne from the Agnes H. Anderson and 171 Research Funds of the University of Washington.

Herbert Taylor, Western Washington College of Education, Bellingham, Washington and Warren Caldwell, University of Washington, have been conducting excavations of cairn sites in the northern Puget Sound area.

Joel Shiner, under the River Basin Surveys, National Park Service, excavated at the Wakemap Mound in The Dalles reservoir area.

Richard Daugherty, State College of Washington, Pullman, Washington, continued excavations at Lind Coulee near Warden, Washington. Funds for the work were made available by a contract between the National Park Service and The State College of Washington.

Oregon. L. S. Cressman reports work by the University of Oregon in both the coast and near The Dalles on the Columbia River. On the coast, sites were excavated at the mouth of the Coquille River on the Bandon sandspit (Ca-5) and on the Netarts sandspit in Tillamook territory (Ti-1). The Bandon site is in the extreme southern part of Coos territory and shows a diverse pattern, a possible result of a northward extension of northwest California influences. The economy of the site indicated a maritime orientation. House types include one with vertical plank wall with a double row of thin planks separated by a supporting beam, and a plank floor, another has a horizontal plank wall, and another with either double walls of horizontal planks or else a single arrangement of two horizontal planks at the base to hold vertical planks. Another type seems to be gabled as shown by a series of post holes down the center and a part of what was probably a ridge-pole. Another type with clearly marked floors without timbers or post-holes which may indicate a temporary structure of mats. The terminal date of this site is about 1850 as shown by trade beads with a burial. The earliest date has not been determined and will be impossible to obtain because of the fact that the river has destroyed a considerable part of the site.

The Netarts site consists of an unknown number of house pits. They are both rectangular and round. The rectangular houses in some cases are over twenty meters in length. Lloyd R. Collins, Research Associate, University of Oregon, was in charge of the work at this site.

The Oregon Coast work was financed by grants from the Wenner-Gren Foundation for Anthropological Research, Inc., The American Philosophical Society, and the University of Oregon.

During August, two weeks were spent excavating at Big Eddy, just east of The Dalles on the south side of the Columbia River. This work was done under contract between the University of Oregon and the National Park Service in the River Basin Surveys program. Richard Emmons was in charge. The site yielded a good series of artifacts and should throw light on the relations between the Plateau and the Coast.

California. R. Squier, University of California, working under a National Park Service-University of California contract conducted a site survey of the Lava Beds National Monument in Modoc County, California. Nearly 200 cave and open sites were located in the lava flows and lakeshore areas.

A. E. Treganza, San Francisco State College, with two assistants made site surveys in over a dozen projected reservoir areas in California, under contract with the National Park Service. Many evidences of aboriginal occupation were located.

R. F. Heizer, University of California, Berkeley, with two assistants conducted a reconnaissance of the High Sierra between Markleeville and Hobart Hills, in the area north and south of Lake Tahoe. A new lithic complex was discovered which may be pre-Washo in time. Excavations in this area will be conducted in 1953.

J. Bennyhoff, University of California, Berkeley, with two assistants conducted an archaeological survey of Yosemite National Park and recorded over 200 sites. The survey is not complete and may be concluded next summer.

R. K. Beardsley, University of Michigan, with a student crew, excavated at Willow Creek, Monterey County, and in the lower Cosumnes Valley. A fifth Early Horizon site was discovered in the latter area, with a culture complex closely resembling that of the site Sac-107 worked earlier.

James Bennyhoff and Albert Elsasser have been appointed Archaeologist and Assistant Archaeologist of the University of California Archaeological Survey.

William J. Wallace, University of Southern California, has reported that investigations of the Little Sycamore Canyon site, southwestern Ventura County have been resumed. Artifacts recovered to date are distinct from those excavated during the spring from a midden on the other side of the creek. The present site contains only mortars and pestles whereas the other midden yielded many manos and metates. Bead types also differ.

Clement W. Meighan has joined the staff at the University of California, Los Angeles, and will conduct a field course in archaeological methods.

B. E. McCown supervised the excavation of a historical Indian village near Temecula, Riverside County, during the summer. An adobe structure was uncovered in the village and an extensive series of artifacts including two coins were found. The San Bernardino Historical Society sponsored the work with the assistance of the Archaeological Survey Association of Southern California.

UTAH. Two miles northwest of Garrison, Utah, on an alluvial fan at the base of the Snake Mountains, a village site has been partially excavated by the summer field school of the Department of Anthropology at the University of Utah. Under the field direction of Sara Price Rudy and Dee C. Taylor, explorations were made in five low mounds and three shallow basins. The mounds contained the ruins of 6 coursed-adobe buildings — of Kanosh type — ranging from one to seven rooms per unit, for a total of sixteen rooms. The basins contained semi-subterranean houses similar to the Grantsville or Willard house types in Utah. The latter dwellings, on the basis of stratigraphy and artifacts, must be considered contemporary with the adobe structures. A full report on this site is now being prepared by Dee C. Taylor. The information regarding the prehistory of western Utah thus gained through excavation complements materials collected by Jack R Rudy who is continuing the archaeological survey of the state.

SOUTHWEST

The summer season, as usual, found many archaeological projects under way. Robert H. Lister of the University of Colorado spent some time in Chihuahua making stratigraphic tests in six caves in Cave Valley. Since the days of Carl Lumholtz (1902) this region has received but little attention and that only in the form of a surface survey. Lister hoped to obtain evidence of preceramic culture, but the six caves contained pottery throughout the deposits; many features differing from those described in the early reports were discovered, however. A report on the work is now in preparation.

In the Rio Grande Valley, north of Santa Fe, New Mexico, two extensive excavations were undertaken. The Laboratory of Anthropology of the Museum of New Mexico worked at Cuyamungue, a Tewa pueblo extending into the historic period and abandoned shortly after 1700 A.D. The project under the direction of Fred Wendorf was seeking information on the period from 1600 to 1700, the first hundred years of Spanish occupation of New Mexico; thirty-five rooms and one kiva of the seventeenth century were cleared. Below this level two additional pueblos were found, extending the occupation back to about 1250 A.D. Seventy rooms and 4 kivas were excavated altogether.

Students from the Department of Anthropology of the University of New Mexico under the direction of Florence Hawley Ellis excavated for six weeks at Pojoaque, only a few miles from Cuyamungue. Five sites within a half-mile square represent the Pojoaque settlements from late Pueblo III times to 1935 A.D., when it was abandoned except for three families. Excavations were made in the dump and the last occupied house of the village inhabited until 1935, as well as in thirteen rooms of the next oldest site which covered the Spanish period. From the latter considerable material on pottery types previously not known or not well known was recovered and will be studied by Bruce Ellis of the Laboratory of Anthropology. Since the primary object of this field session was an ethnological study in acculturation of the living Pojoaque Indians (with considerable Spanish-American mixture), the excavations were undertaken to supplement interviews and observational studies. Florence Ellis will prepare for publication the reports of the various students ranging from sherd counts to extended kinship terminologies.

John Turney of Bandelier National Monument made a complete archaeological survey of the Otowi section of the Monument. His findings will be combined in a single report with analysis of sherd collections from the main Otowi ruin, deriving from stabilization work done by Robert Lister several years ago and hitherto unstudied. Other National Park Service projects in New Mexico included a reconnaissance survey of a proposed reservoir area on the Pecos River just above Santa Rosa, N.M., by Charlie R. Steen, and a major excavation and stabilization project at Yellow House in Chaco Canyon, by Gordon Vivian of Southwestern National Monuments Headquarters.

W. C. Holden and eleven students from Texas Technological College worked at two locations in New Mexico from July 27 to August 24. The undergraduates continued excavations at the Bonnell site 14 miles east of Ruidoso, and the graduates excavated on the Sultemeier Ranch on the Gallo River, 21 miles southeast of Corona. A report on the work at the Bonnell site in 1950, '51 and '52 has been published in the 1952 *Bulletin of the Texas Archaeological and Paleontological Society*.

Malcolm F. Farmer of the University of Washington spent the summer at the Museum of Northern Arizona continuing his work on Navaho territorial boundaries. An archaeological survey was undertaken to determine more accurately the territory and periods of Navaho movements toward the west into Arizona. Tree-ring specimens were collected from old hogan sites, and a summary of tree-ring data relative to Navaho occupation is in preparation. Key sites will be located for future excavation.

M. Harner, University of California, Berkeley, surveyed on the Colorado River near Blythe, California and excavated a site at Bouse, Arizona. The deep deposit, over twenty feet in thickness, appears to have been laid down in an old walk-in well. Hohokam and Anasazi pottery in the deposit associated with Yuman wares presents possibilities for cross-dating and may permit assigning dates to the local Yuman wares.

H. Thomas Cain was appointed Curator of Anthropology at the Heard Museum, Phoenix, In July. The collections of the Museum are being completely recatalogued and extensive exhibition changes are planned to give greater emphasis to southwestern archaeology and ethnology. The Arizona State Museum at Tucson is now preparing an exhibit on the archaeology of the Point of Pines area.

Charles C. DiPeso of the Amerind Foundation has been preparing for publication the report on his excavations at Quiburi, in the San Pedro Valley. The finished volume is tentatively promised early in 1953. DiPeso is making a survey of the San Pedro Valley south of Benson to locate sites that will throw additional light on the Sobaipuri problem and the period between 1400 and 1700 A.D. It is planned that the future excavations of the Amerind Foundation will recreate the cultural sequence of the valley by working back step by step from historic to prehistoric times.

The University of Arizona's 1952 season at Point of Pines was directed by E. W. Haury, assisted by E. B. Danson, and was divided into three projects: First were further studies in the principal metropolis of the area, revolving around: (a) The excavation of a number of burnt rooms which were inhabited during the 13th century by immigrants from northern Arizona — the destruction of these rooms during occupation resulted in the preservation of large amounts of material culture, which will provide the basis for an eventual study of acculturation in pre-Spanish times; (b) the recovery from a cremation ground of a large number of urns with cover bowls which, in addition to providing superb museum materials, has also provided the basis for establishing ceramic associations in a positive form; (c) extensive trenching to determine the sequence of arroyos, hence climatological changes for the region, between the 13th and 15th centuries. Two erosion channels have been identified and related to the archaeological history. The earlier of these channels correlates with the drought reflected in tree-rings from 1276-1299 A.D., and the later channels in all probability date from the 15th century, roughly coincident with the time when the Pueblo Indians abandoned the area. A second objective was the excavation of a small cliff ruin in Pine Flat which, in addition to an interesting architectural stratigraphy extending roughly from 1100 to 1300 A.D., also produced the first Apache archaeology in the area in the form of pottery, basketry and hides. The third project involved extensive digging in a small pueblo of the Tularosa phase, to sharpen the definition of that period in the Point of Pines region.

Odd Halseth of Pueblo Grande, Phoenix, reported that excavations started there last summer under the direction of Francis Cassidy will continue on a six-acre area where features will be restored as out-door exhibits. Fall work was concentrated on a ball court having more than three feet of fill above the original floor.

At the invitation of a field party of the U.S. Geological Survey, Walter W. Taylor of Santa Fe undertook, during late August, a week's reconnaissance in northeastern Arizona east of Kayenta and north of Comb Ridge. Some interesting ceramic problems developed during the work which also served to demonstrate the potentialities of such cooperative ventures.

National Park Service activities in Arizona included excavation and stabilization at Wupatki National Monument near Flagstaff by Roland Richert, under the general direction of Gordon Vivian; and test excavations by Joe Ben Wheat of small sites near the wayside Museum of Archaeology in Grand Canyon National Park.

At Mesa Verde National Park in southwestern Colorado, J. A. Lancaster continued an intensive systematic archaeological survey of Chapin Mesa. The park staff has recently completed preparation of sites excavated by Lancaster in 1950 as a series of out-door exhibits, on the main circle drive in the park, where visitors can see the complete story of the development from pit house to kiva and storeroom to pueblo from about 500 to 1276 A.D. Structures of different ages were carefully excavated and covered over with ramadas to protect them from the weather, and easily-read explanatory labels have been installed. Final reports on the excavations and finds are being completed for eventual publication.

In southern Utah, an archaeological reconnaissance of Glen Canyon of the Colorado River was made for the Museum of Northern Arizona by Gene Foster during two boat trips, in May and November respectively. Stops were made at the mouths of seven tributary canyons and eighteen sites were located, a large number considering the difficulties of the terrain but a small proportion of those that probably exist there. The sites range in age mostly from late Pueblo II through early Pueblo III, though some of Basketmaker age were also found. Many flake areas were located, but no points of the types associated with "early man" were found. Numerous pecked and painted petroglyphs were also recorded.

Albert H. Schroeder of the National Park Service is preparing a detailed report of the CWA survey and excavations in 1934 made by the late Ben Wetherill in Zion National Park, Utah.

Jack Rudy of the University of Utah, assisted by Alice Hunt, and Bates Wilson, research assistants, made a reconnaissance in the area south of the confluence of the Green and Colorado Rivers in San Juan County, Utah. More than 100 sites were located. Some of the ceramic complexes are almost pure Mesa Verde in style. Another feature is the frequency of a round tower 2-3 stories in height associated with the ruins.

Several important tree-ring dates have been obtained on Southwestern archaeological materials since the issuance of Smiley's compilation as of 1951 (A summary of tree-ring dates from some Southwestern archaeological sites, *Laboratory of Tree-Ring Research Bulletin No. 5*, University of Arizona, Tuscon, 1951, issued in 1952). The most significant is that of 46 A.D. from Durango, Colorado (*Tree-Ring Bulletin* Vol. 18, No. 4, April 1952), mentioned in the DENDROCHRONOLOGY section of the July 1952 Notes and News.

Of special interest to Southwesternists is a group of additional dates recently determined on some new material from Chaco Canyon sites investigated by R. G. Vivian of the National Park Service. The following were obtained by Bryant Bannister of the Laboratory of Tree-Ring Research and checked by T. L. Smiley and Dr. Douglas:

Site Bc59, Kiva 2, three separate dates at 1110 A.D. *Casa Chiquita*, one date of 1060 plus. *Yellow House (Kin Kletso)*, a series of dates from Vivian's recent excavations: (a) timbers in the walls at first-story ceiling height range from 1059 to 1076 A.D. (b) a few second-story timbers are dated at 1123-1124 A.D. (c) charcoal recovered in the fill ran from 1088 to 1171 plus and 1178 plus.

The dates from construction members from all three sites correspond well to the previous findings of major concentration of dates between 1030 and 1090, especially 1040-1070, with construction dates continuing into the first quarter of the twelfth century. The charcoal dates from Yellow House extend the range of known tree-ring dates from Chaco Canyon by 50 years, the latest date previously secured being one of 1130 A.D. from Pueblo Bonito. Evidently the construction and reconstruction that went on during the last hundred or hundred and fifty years of occupation of the Chaco Canyon utilized beams already cut (see discussion in H. S. Gladwin, The Chaco Branch, *Gila Pueblo Medallion* 33, 1945, pp. 100-30 and pp. 150-2), and tree-ring dates from the late phases are to be expected only in the form of charcoal from firewood.

SOUTHEAST

River Basin Surveys. In August, Carl F. Miller, Smithsonian Institution, went to the Grenada Reservoir area on the Yalobusha River, Mississippi, to check several sites for possible excavation. He found that extensive investigations would not be warranted and, as a consequence, no additional work is planned there. Since returning to Washington Miller has been completing his reports on his previous work at Allatoona and James H. Kerr (Buggs Island) reservoirs.

Joseph Caldwell, National Park Service, is preparing his final draft on manuscript of the Allatoona Survey in the Laboratory of Archaeology at Athens, and leaves for the Hartwell Dam survey in November.

1952 Southeastern Archaeological Conference. Meetings were held at the Ocmulgee National Monument, Macon, Georgia, October 31 and November 1. Approximately forty people participated and in contrast to former conferences a planned program was presented. This was centered on the problems of historic archaeology and the approach was in terms of identifiable ethnological units. Papers were presented on the following groups (in order): Timucua, John M. Goggin; Proto-Creek, Charles Fairbanks; Ocmulgee Creek, Gus Pope; Kasita Creek, William Sears; Eastern Seminole, John M. Goggin; Choctow, William Haag; Chickasaw, Jack Cotter; Northern Cherokee, T. M. N. Lewis and Madelaine Kneberg; Southern Cherokee, A. R. Kelly; Guale, Joseph Caldwell, Sheila Caldwell, Bessie Lewis, and Lewis H. Larsen, Jr. Papers on the Western Seminole by Ripley Bullen and the Natchez by George Quimby were read in the absence of their authors.

In addition a preliminary session on worked flint continued the program from the last session. Papers were given by Edward Scully and Joffre Coe on Upper Mississippi Valley and North Carolina, respectively. The final report was a survey of problems and possibilities in the study of Spanish material culture by John M. Goggin.

The 1953 meeting will be held at the University of North Carolina about the first of November, the exact date to be announced later. Joffre Coe was elected Chairman and Ernest Lewis, Secretary, for the coming session.

South Carolina. A. R. Kelly of the University of Georgia carried out a summer exploration at the site of Mulberry Plantation, on the Wateree River, Camden, South Carolina. The Charleston Museum and the Commissioners of Kershaw County, with the cooperation of the plantation owner, David R. Williams, cooperated with the University of Georgia in sponsoring the salvage excavations of a large mound and village area being washed away by floodtides of the Wateree River. The excavations yielded excellent collections from both mound and village related to a South Carolina-Savannah river variant of the Lamar culture, similar to material found at Rembert mounds, final stage of Irene mound and the Cusabo territory of the Carolina coast. Stratigraphic indications of a stylistic variation are apparent between pre-mound and village occupations.

Georgia. Field work during the summer and fall of 1952, by the University of Georgia, was concentrated at three sites: Kolomoki, Kinchafoonee (see EARLY MAN above) and historic Tugalo. William H. Sears completed his fifth season of exploration at Kolomoki Mounds State Park, Blakely, Georgia, with excavation of two small mounds and additional work in the village area. The mound explorations uncovered evidences of structures but no additional elaborate mortuary features and burial pottery caches such as were found in previous work. Plans for Kolomoki now call for an intensified program of museum extension and exhibit preparation, and the writing of a final report on Kolomoki which will occupy Sears during 1952.

Exploration at the site of Tugalo, Cherokee landmark near Toccoa, supervised by William E. Edwards, continued from June well into October, concentrated in the village area. A surprisingly vigorous and robust Lamar culture was uncovered at all depths, down to 36 inches, with inclusions of historic trade materials. The site has a terminal date of *circa* 1775, and excavation data point to a protohistoric extension back into the 17th century. The Lamar focus uncovered here is very divergent from historic Cherokee sites in the Allatoona-Rome sector of Georgia, and from protohistoric Siouian sites (Mulberry Plantation) in South Carolina. The Tugalo project is sponsored jointly by the Cherokee Historical Association of Cherokee, N.C., and the University of Georgia.

MISSISSIPPI. An investigation of the late Mississippian, Walls-Pecan Point horizon in the northwestern part of the state is being started by Robert Rands of the University of Mississippi. The basis for the work is a study of the large, mostly unpublished, Davies Collection at the University, originally from the site of Walls. This will be supplemented by spot excavations. The project is being fitted into the work of the Lower Mississippi Valley Archaeological Survey, in which the University has been invited to participate.

FLORIDA. Glenn Allen, graduate student of Florida State University spent part of the summer exploring several islands off the coast of Franklin and Wakulla counties, within the northwest coast archaeological area of Florida. Several stratigraphic tests were made on hitherto unrecorded sites. During the second part of the summer, he made site surveys on the adjacent mainland, and excavated a new site complex. Skeletal material and trade objects were recovered from a burial mound in process of levelling by the state road department.

Two students of the University of Florida, Paul Hahn and William Plowden, carried out 14 days of excavation with a 10 man crew at the Fountain of Youth Park in St. Augustine. Extensive remains dating from the Orange period to historic times were found including post impressions of a circular prehistoric Indian house and an historic wall or stockade.

Fall excavations include work at the Richardson site near Gainesville. This is an early historic (*circa* 1615) Potano culture site, perhaps the mission outstation of Apalo. A large artifact sample and extensive postholes were found. A report is in preparation by Julian Granberry, a graduate student.

WEST INDIES

Hale G. Smith, Florida State University, toured the West Indies, Venezuela, Colombia, and Panama, in the interests of a projected circum-Caribbean research program. Three students, H. Morgan Smith, Taizo Maike, and Robert Steinbach spent the summer in Panama, making ethnobotanical and archaeological type collections.

John M. Goggin, University of Florida, made two trips recently to the Greater Antilles. The first included two weeks in the southern Bahamas where a site survey was made of certain islands. The second trip in the latter part of the summer was a continuation of research on the Spanish contact period with special attention to ceramics. This involved the study of public and private collections in Havana, Holguin, and Santiago, Cuba; Kingston, Jamaica; Port au Prince, Haiti; and Cuidad Trujillo, Dominican Republic.

In the latter country a field survey and surface collection was made in cooperation with the Institute of Anthropological Investigations of the University of Santo Domingo. Ing. Emil De Boyrie Moya, director of that institution, furnished facilities for joint field work. A series of early colonial sites including Isabela (1493-1503) and La Vega Vieja (1514-1562) were visited. Significant surface collections were obtained at these and other sites.

Plans are being made to take a student group to Havana during the Thanksgiving vacation. The program calls for some field collecting and museum study.

MIDDLE AMERICA

MAYA AREA. The most important event in Middle America is the discovery of the secret chamber under the pyramid of the Inscriptions at Palenque by Alberto Ruz and his assistants, Rafael Orrellana and Cesar Saenz, all of the Instituto Nacional de Antropologia e Historia de Mexico. In 1949 Ruz discovered a removable stone slab flush with the floor of the central room of the Temple of the Inscriptions. On raising this a vaulted stairway, completely filled in ancient times with rock and rubble, was brought to light. The removal of this fill was a slow task. The stairway descends westward (the building faces in a northerly direction) to a landing, where it makes a 180° turn to continue downward in an easterly direction. Two light and ventilator shafts, horizontal and about 4 m. long, connect the landing with the exterior of the pyramid.

By June of this year the staircase had been cleared to a depth of about 18 m. (the height of the pyramid is about 21 m.). A wall was found across the passage, and by it a masonry box containing jades, a pearl, pottery, and shells filled with red paint. After breaking through the wall, Ruz found a short passage which terminated at a large triangular slab, in front of which six adolescents had been buried (sacrificial victims?). On removing the slab the explorers found they were looking down into a vaulted chamber. A short flight of steps (a later addition) led to the floor of the chamber, the greater part of which was occupied by a masonry base, on which rested a somewhat larger carved slab (approximately 3.5 m. by 2.25 m.). Short stone supports run from the sides of the base to the walls of the chamber, suggesting that the base may be hollow and that they were inserted to check bulging.

The top of the slab carries a magnificent sculpture within a planetary band. At the base is a head of a terrestrial monster, on which a man reclines in a strange position as though he were falling backward. He gazes up at a tree or conventionalized maize plant which rises behind him or possibly issues from his stomach. On top of this is perched a so-called quetzal bird. Both the tree and the bird are almost identical with those on the Tablet of the Cross. The sides of the slab carry Calendar Round dates, most of which occur in other Palenque texts (e.g., 2 Cib 14 Mol). These suggest a date for the slab of about A.D. 692 (11.16.0.0.0 correlation), which is that of the tablets in the temple above.

Around the walls of the chamber are nine stucco figures in Palenque style (the number suggests they may represent the nine lords of the underworld). Some of them are a little damaged — the room was a fairy cave of stalactites and stalagmites when found.

On top of the carved slab there was an offering of slate pendants and numerous pieces of a jade mosaic; at its base two magnificant stucco heads, painted red, had been deposited. Another offertory was beneath the steps leading down into the room.

The transverse beams which tie the sides of the vault are not the usual wooden poles, but of a dark and veined stone which contrasts beautifully with the limestone of the vaults. This is the first time stone tiebeams have been found in the Maya area.

A serpent's head with open mouth almost touches one side of the slab; its hollow body crosses the floor and continues up the steps to the trapdoor of the temple above. For the greater part of its length it is of masonry and rectangular in cross section, and set on one side of the stairway. It is reminiscent of the tubes communicating with the surface in Ecuadorian burial shafts.

The floor of the chamber is a little below the level of the court outside (about 21 m. below the temple floor). The room must surely have been built before the pyramid, for, apart from the difficulty of digging through the pyramid to build room and staircase, the carved slab is too big and too heavy to have been introduced by the stairway. By the time this is in print Ruz will have discovered what, if anything, lies below the base of the slab.

Mexico. In Veracruz Garcia Payon conducted tests at Mata Verde and at Chalahuite, both in the Zempoala region. They yielded material which correlates with Lower Tres Zapotes (pre-classic). He has continued consolidation of Building A, Tajin Chico, and has started exploratory trenches at the nearby site of La Concha. Melgarejo Vivanco and Medellin Zenil have sampled a number of sites in central Veracruz to find the extension of the Remojadas culture. This embraces three main periods — pre-classic, classic (including yokes, *palmas*, smiling faces, and elements of classic Teotihuacan), and renaissance (three ceramic types of Isla de Sacrificios, Tres Picos, and Quiahuitzlan, which at their start are associated with plumbate and Fine Orange).

A small residential site on the outskirts of Teotihuacan is being investigated by Carmen Cook de Leonard, Alfonso Soto Soria, and Manuel Vargas Castelazo. Particular attention is being paid to the caves in this region which were used as residences from the earliest Teotihuacan times to the Aztec period (some are still used as residences). Rough walls of large boulders were built across entrances as a protection against the weather.

Necrology. We report with sorrow the death of Oliver G. Ricketson, Jr., for many years a member of the staff of Carnegie Institution of Washington. His first trip to the Maya area was in 1921, when he accompanied Morley on an exploratory trip to the Peten and Usumacinta. He was in charge of excavation at Uaxactun from 1926 to 1930. The existence of pre-classic horizons in the Maya area was first established by his excavations in Group E at that site. He also uncovered the famed structure sub-EVII, the first pre-classic pyramid found in the Maya area.

Tlatoani. This new bi-monthly journal, of which four numbers have appeared so far (Nos. 1 and 2 out of print), is under the auspices of La Sociedad de Alumnos de la Escuela Nacional de Antropologia e Historia. The editor is Señora Carmen Cook de Leonard.

SOUTH AMERICA

British Guiana. Clifford Evans and Betty J. Meggers will be in the field from October, 1952 to May, 1953, carrying out a program of archaeological survey and excavation in British Guiana under the Fulbright Act, with the sponsorship of the Smithsonian Institution and the cooperation of the British Guiana Museum. They plan to run a survey up the Essequibo River to its headwaters, which adjoin those of the Mapuera River, a stream which eventually flows into the Amazon a short distance above Santarem. Stratigraphic excavations will be made wherever possible, and special attention will be devoted to the coast in the Northwest District.

Brazil. H. V. Walter has recently given an account of the progress of his excavations in rockshelters around Belo Horizonte in Minas Gerais. Evans reports to the Assistant Editor that Walter: is continuing his work in the Mãe Rosa and Eucalyptus rockshelters and in addition has discovered a new shelter, Limeira, in the area. The interesting thing about these various shelters is the abundance of bone arrowpoints from Mãe Rosa, the mixture of both bone and quartz arrowpoints from Eucalyptus and the presence of only quartz points at Limeira. The stemmed quartz points are counterparts of the bone points and there is little doubt that some sequence in these caves can be worked out on bone and stone arrowpoint typology.

TEXAS ARCHEOLOGICAL SOCIETY

The 23rd annual meeting of the Texas Archaeological and Paleontological Society was held in the new Fondren Science Building at Southern Methodist University in Dallas, Texas, on November 1. Papers were presented as follows: Excavations at the Morris Site, Cherokee County, Oklahoma (Robert E. Bell); Excavations at the Bonnell Site and on the Gallo River, New Mexico (W. C. Holden); Some Material Culture Elements Common to the Southwest, Northern Mexico, and the Southern Plains (Charlie R. Steen); The Carbon-14 Dating Laboratory at the University of Texas (Alex D. Krieger); Excavations in the Falcón Reservoir, Rio Grande Valley (Joe F. Cason); Resumé of Culture Chronology in the Dallas Area since Glacial Times (Wilson W. Crook, Jr., and R. K. Harris). Discussions of geological correlations and cultural dating in Texas were held, and kodachromes of the principal recognized projectile point types of Texas were shown and discussed by E. B. Jelks, Alex D. Krieger, and T. N. Campbell, together with discussion of typological problems and principals of procedure. The following day a field trip was made to the Wheeler site near Ca-

Carrollton, Texas, to view the geological stratigraphy and the position of artifacts defining the Carrollton and Elam foci, local representations of the generalized Archaic pattern in Texas.

During the business meeting, it was decided to change the name of the organization to The Texas Archeological Society, dropping the "a" before the "e" in the spelling. Dr. Robert E. Bell, chairman of the Anthropology Department, University of Oklahoma, was elected President for 1953, and Dr. W. C. Holden, Vice-President; Ernest Wallace was re-elected Secretary-Treasurer (now on leave), Miss Noyce Jennings was elected as Acting Secretary-Treasurer, and Alex D. Krieger, as Editor.

ERRATUM

I should like to call attention to an error in *The Fort Ancient Aspect* which has been made known to me through the kindness of Mr. Sigfus Olafson, President of the West Virginia Archaeological Society. On page 240 of *The Fort Ancient Aspect* I refer to a site near the town of Clifton on Paint Creek, Kanawha County, West Virginia. It now appears almost certainly that this is the same site as that which was excavated for the National Museum by Colonel Norris and their collection, I am sure, was unfortunately miscataloged as in Fayette County, West Virginia. One of the things which confused me in my allocation of this site to the correct place was that the present village of Clifton, West Virginia is in Mason County. There was a village named Clifton on the Kanawha River near Paint Creek as reported by Thomas, but on the maps that I used the town is called Pratt, which is the name at present of the old village of Clifton. On Map I in this volume on the Fort Ancient material, I unfortunately mislocated the site of Clifton for either its place in Mason County, Fayette County, or Kanawha Connty. It should be placed at the position of Pratt in Kanawha County, West Virginia.

James B. Griffin
Museum of Anthropology
University of Michigan
Ann Arbor, Michigan

NOTES

Alex Krieger reports the good news that a radiocarbon dating laboratory has been approved at the University of Texas by its Board of Regents. The project was recommended by President T. S. Painter before his retirement on August 31. Equipment has been ordered and it is hoped to have the laboratory operating by spring of 1953. Professor L. O. Morgan, radiochemist of the University, will supervise its construction and operation. Correspondence in regard to acceptance of samples for dating should be addressed to A. D. Krieger, Department of Anthropology.

The University of Utah Press has just discovered hundreds of copies of the famous "The Great Basin" containing, among other papers, Antev's "Climatic Changes and Pre-white Man," which has been reported as being out of print. This notice is being printed for the readers of *Antiquity* who still want this paper. It costs $2.00 per copy; 10% discount will be given on orders for 5 or more copies. Order "The Great Basin," *The Bulletin of the University of Utah*, Vol. 38, No. 20, June 30, 1948, from the Director; University of Utah Press, University of Utah, Salt Lake City 1, Utah.

The Fifth Annual Meeting of the Florida Anthropological Society will be held at the Universty of Florida in Gainesville on Saturday, February 7, 1953. Ripley P. Bullen of the Florida State Museum and John W. Griffin of the Florida Park Service are in charge of arrangements.

The 19th Annual Meeting of the American Society of Photogrammetry was held on January 14, 15, and 16, 1953, at the Shoreham Hotel in Washington, D.C. There was a panel on "Arctic Mapping" as a joint project of Canadian and American speakers, and a full day was devoted to "Photo Interpretation" with its applications to the sciences, industry, and military intelligence.

EDITORIAL STAFF CHANGES

As many members already know, the difficult job of ASSOCIATE EDITOR of *American Antiquity* changes hands with this issue. The Associate Editor is Book Review editor and collates all Notes and News.

Dr. Albert C. Spaulding, Museum of Anthropology, Museums Building, University of Michigan, Ann Arbor, Michigan, has accepted the job for the remainder of the sentence imposed upon the current editorial staff. Dr. Erik K. Reed, who has done such conscientious work, was forced to give up the position because of the press of other work.

Please note, and pass on the information, that all publications for which either a BOOK REVIEW or BOOK NOTICE is desired should be sent direct to Associate Editor Spaulding.

Malcolm F. Farmer replaced Cal Burroughs as PACIFIC COAST editor last August.

ANNUAL MEETING

The 1953 Annual Meeting of the Society for American Archaeology will be held at the University of Illinois, Urbana, Illinois on May 7-8. Tentative program plans include: Section Meetings for Miscellaneous Papers, Symposia on Topics of General Interest, and Technical Work Sessions (to be scheduled on request for small groups).

Members will receive more explicit information about the program and the details of local arrangements from J. Charles Kelley, program chairman.

MEMOIRS OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY

Numbers 1-5 and 8 are bound and sold separately.

1. *Big Bead Mesa: an Archaeological Study of Navaho Acculturation, 1745-1812.* By DOROTHY LOUISE KEUR. vi+90 pages, 4 plates, 5 figures. $1.00.
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JENKS, ALBERT E., and LLOYD, A. WILFORD
1938. The Sauk Valley Skeleton. *Bulletin of the Texas Archaeological and Paleontological Society*, Vol. 10, pp. 136-68. Abilene.

Citations from separate books or pamphlets:

JENKS, ALBERT E.
1936. *Pleistocene Man in Minnesota.* Minneapolis: University of Minnesota Press.

Footnotes should be held to a minimum, used only when essential information cannot be incorporated into the text. All bibliographic citations should follow the documentation style commonly used in archaeological publications in which all reference to published or manuscript material is made directly in the text by citing author, year of publication, and page or figure number; such citations are set off from the text by parentheses. For examples of style consult articles in Smithsonian Miscellaneous Collections, Volume 100 (whole volume), 1940.

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